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Correct spelling of the name of the author of the Alberta bull snake article is: George B. Pendlebury.

THE NEW EDITOR — J. B. GOLLOP

by JAMES A. WEDGWOOD*

With the March issue J. Bernard Gollop became editor of the Blue Jay. It is my pleasure to introduce Bernie to the readers.

Dr. Gollop, an ornithologist, is a Research Scientist with Canada Wildlife Service and can be found — when not attending a meeting or in the field — in the Prairie Migratory Bird Research Station at Saskatoon. Enter his office and you will see a man at a slightly cluttered desk, surrounded by books, journals, maps, charts, and photographs. He will be looking at you with intent, friendly eyes. One glance around the room will leave no doubt as to his work and his interest: practically everything is about birds.

Projects on which he has been or is engaged include waterfowl censuses, crop depredation, distribution and mortality of mallards, and mallard population predicions. Field work has given him acquaintance with much of the southern portion of he three prairie provinces and North Dakota. Other studies have taken him to the nesting grounds of Ross' Goose in the Arctic, and to closer points such as The Pas, Meadow Lake and Last Mountain Lake. A field trip of a different sort was a survey of bird research stations in Western Europe.

In addition to scientific papers for the North American Wildlife Conference and he International Ornithological Conference, Bernie has written articles for the *Canadian Field Naturalist*, the *Minnesota Naturalist* and the *Blue Jay*. Our own journal has carried a number of his contributions over the years. Bernie is the author of he bird section in the *Atlas of Saskatchewan*. Active in the Mississippi Flyway Council Technical Section, he is a member of the Canadian Society of Environmenal Biologists and has served on the executive of the Saskatoon Natural History Society.

An organizer of a bird survey of 100 townships around Saskatoon, he provided he initiative and leadership that made it a success. In addition, for five years he was editor of the Saskatoon Bird Review which recorded the results of the survey; by the ime it was finished, it required the handling of over 30,000 observations on birds urned in by several score naturalists. It is nothing for Bernie, a man of great energy and drive, to be out at dawn to find a flock of unusual sandpipers, do a morning's work in the office, make an inspection trip in the afternoon to a project, then go for a casual birdwatching drive in the evening with Maddie, his wife. They met, by the way, in a bird club in Montreal and came West in 1947. Their son Michael quickly became a competent naturalist in his own right; his first article appeared in the *Blue Jay* when he was fourteen.

In naturalist circles Bernie is held in high regard for his generosity in helping people. Be he acquaintance or stranger, the person who calls in bafflement about the dentification of a bird receives prompt assistance and suggestions. Express an interest in behaviour or populations or migration or any other feature of bird life, and Bernie will go to no end of trouble to put one in touch with articles, magazines and books on the subject.

Every executive member was acutely conscious that appointing a new editor would be the most important action the Board would take during its term. Bernie, quite aware of the implications of the editorship, agreed to assume the trust only after considerable thought and many discussions with persons acquainted with the ournal one way and another. The Board is confident the trust is in good hands.

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610 Leslie Ave., Saskatoon, Saskatchewan

KILLDEER BADLANDS —

A Prairie Natural Area

by MARILEE D. CRANNA*

The Killdeer Badlands are located in Saskatchewan, 8 miles west of the West Poplar border crossing and 18 miles southwest of the historic Wood Mountain Northwest Mounted Police Post (Fig. 1). They form a unique focal point for an extensive area of relatively unmodified short-grass prairie and are recommended by the Conservation Terrestrial Section of the International Biological Programme (IBP-CT) for preservation as a Natural Area. The badlands region was once considered for inclusion within the boundaries proposed for a much larger grassland national park between Val Marie and Killdeer, Saskatchewan.

As far as is known, no intensive biological work has been conducted specifically within the badlands. Studies of a reconnaissance nature have been made of the proposed national park.[2 3 6 8 9 12] The soils have been described and an extensive study of the Wood Mountain geology has been completed.[1 7 13 5] Paleontological information has been recorded by L. S. Russell.[10 11] M. Syroteuk, University of Saskatchewan Geography Department, has conducted graduate research studies in the Wood Mountain area.

Numerous features of natural and historical interest are contained within this sizeable short-grass prairie and, in June, 1970 an IBP-CT inventory and description of the landscape, vegetation and human impact was completed. Of the 24 short-grass prairie areas inventoried to 1972, the proposed Wood Mountain-Killdeer Badlands Natural Area has the highest priority. It amply fulfills the requirements for educational and research potentialities.

Study Area

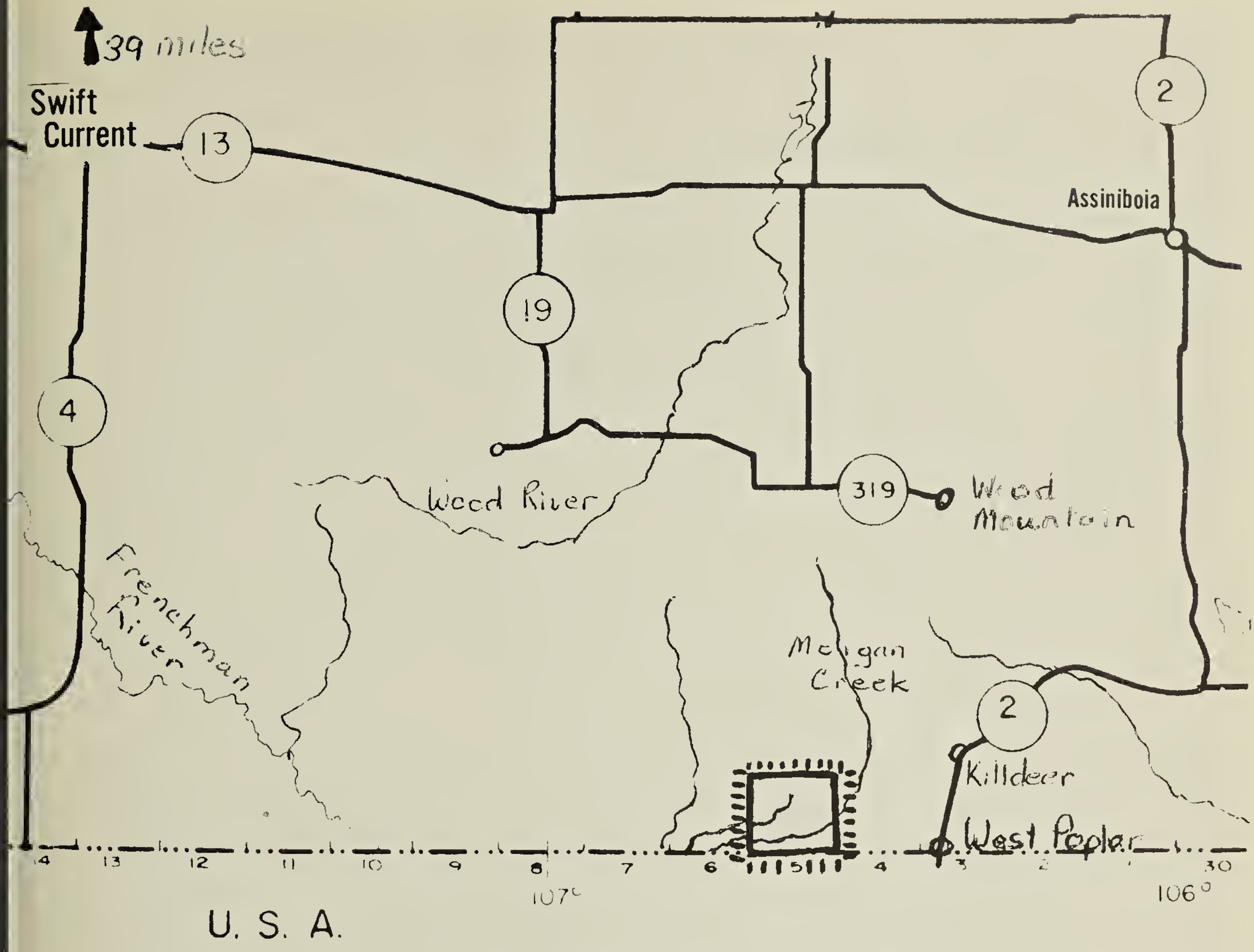
The area chosen for study, Townshi 1, Range 5, West of the Third Meridia (49°0′ — 49°15′ N. Lat.; 106°33′ — 106°40′ W. Long.) consists of 36 squar miles of leased provincial crown lan (Fig. 2). It includes part of the Con tinental Divide, which separates th waters flowing north to Hudson's Ba and south to the Gulf of Mexico. Loca drainage is by southward-flowin Morgan and Rock Creeks. Access to th area is difficult particularly followin wet weather, for the terrain is rugge and it is dissected by numerous salin creek beds. No well-travelled roads lea into the area and it is crossed by only few pasture trails (Fig. 3).

The Wood Mountain climate typifie that of the prairies, being characterize by the extremes of long, cold winter and short, hot summers. Cool nights ar the rule regardless of daytime maximu temperatures. The generally dry at mosphere and rapid evaporation mak the summer's heat quite tolerable. In th normal year the growing season i estimated to average 170 days and th mean annual total hours of sunshine ex ceeds 2,200, the highest in Canada.

The average annual precipitation about 13 inches with snowfall pa ticularly light. The values vary annuall with frequent periods of drough Sometimes the prevailing westerly win take the form of warming chinooks, b rarely do they last long enough t remove the snow cover completely Specific temperature and precipitatio records have been recorded at We Poplar since October, 1956.

Situated completely within the sem arid Brown Soil Zone, the area dominated by brown chernozemic soi

*Department of Plant Ecology, University of Saskatchewan, Saskatoon, Saskatchewan.



ig. 1. The location of the proposed Wood Mountain-Killdeer Badlands Natural Area in southern Saskatchewan.

n well-drained, non-eroded sites. Exensive regosolic soils, exhibiting poor rofile development characterize the roded and outwash sites. Alluvial soils, eft by flowing water, occupy the valley ats adjacent to the stream banks. Often ese floodplain soils are saline reflecng their association with the dark grey arine shales beneath the glacial eposits.

Vegetation, nowhere dense, is typical f the short-grass prairie and reflects its ridity. Many plants are early bloomers take advantage of the more vourable moisture conditions and oler temperatures of spring. A diverty of habitat types are commonly epresented, the vegetational associaons ranging from poor quality salt-npregnated grasslands, and dry, eroded ravelly outwash areas to good quality razing lands and moist, sheltered oodlands. Local marsh areas occur in ssociation with the few streams, ponds and springs. Different soil types and the changing moisture regimes due to irregular topography are reflected in the vegetational patterns. Other factors such as prairie fires, grazing and trampling significantly influence the nature of the vegetative cover.

Physiography and Geology

The proposed natural area includes a variety of interesting topographic and geologic features and represents well the Wood Mountain Upland physiographic region. Particularly impressive are the extensive flat to undulating tablelands which reach a maximum altitude of 3,150 feet. Dissecting these are creek valleys and coulees of variable width, depth and steepness. The minimum altitude is 2,625 feet.

The surface features of the countryside result from glaciation and subsequent wet and dry erosional processes. Locally eroded deposits of bouldery

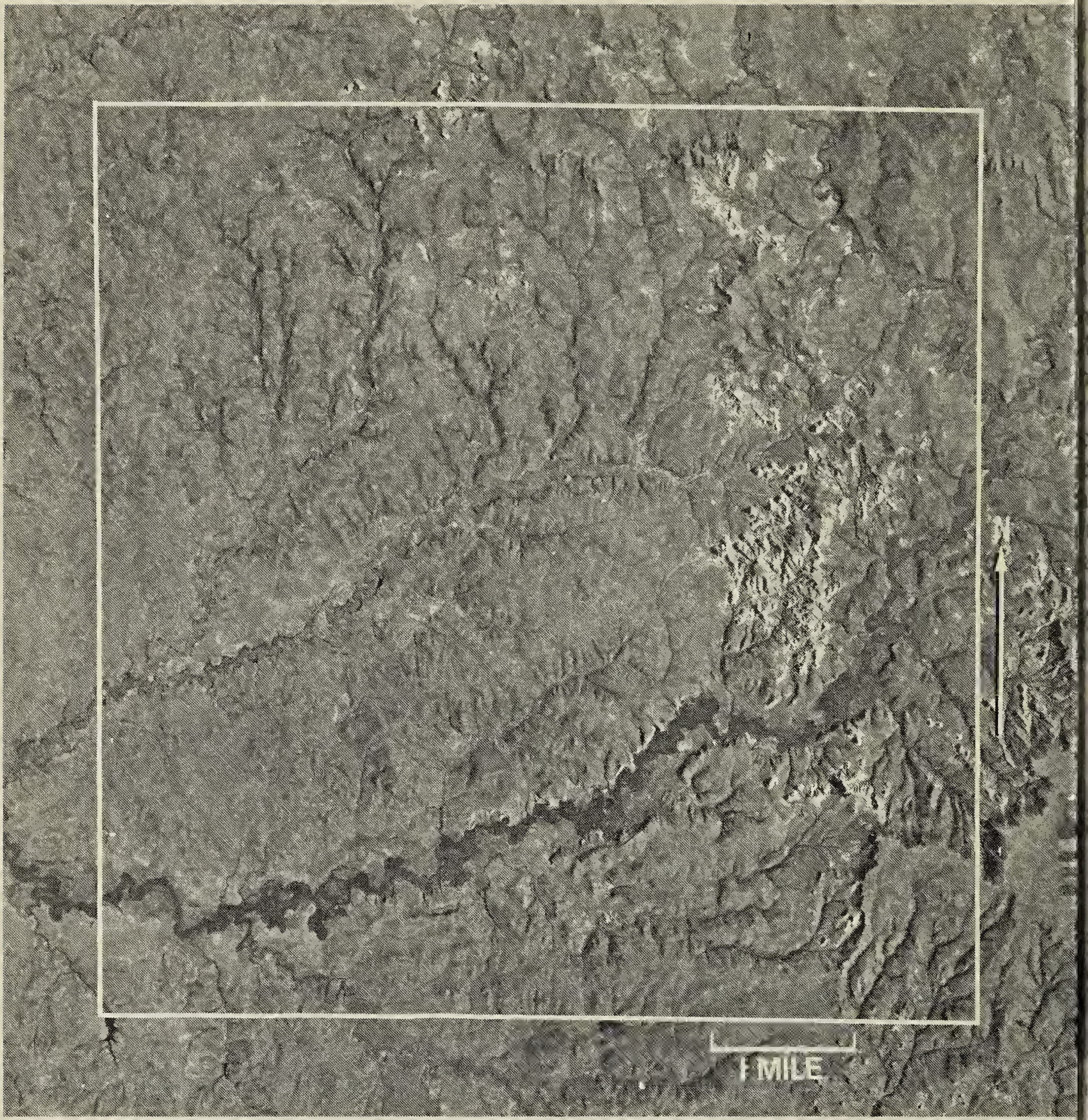


Fig. 2. Aerial view of the study area showing the general physiography. Morgan and Ro
Creeks dissect the landscape. The bounded area is TWP 1 Range 5 West of 3rd Meridia
(Air photo A21760, Dept. of Energy, Mines and Resources, Ottawa.)

glacial till form a thin veneer over the uplands, the mantle being so shallow that from aerial views, much of the preglacial topography is evident. An abundance of well-rounded quartzite gravels mixed with Precambrian rock fragments characterize the glacial deposits. Glacial erratics of smooth, often striated rocks and boulders dot the landscape. Where the last glacier stagnated, local areas of hummocky or knob and kettle terrain are represented.

Since the glacier disappeared from the region about 20,000 years ago, late glacial and postglacial wind and wat
erosion has removed some surfac
deposits and has carved the underlyi
sedimentary strata into unusual form
Strikingly-sculptured badland
featuring extensive bedrock exposur
are located where the Morgan Cree
Valley widens in Sections 11, 12, 1
14, 23 and 24 of Township 1, Range
(Fig. 4). These are best viewed fro
atop the plateau in Sections 12 and 1
Adjacent to the badlands, on the nort
facing slope of the valley in Section 1
is an unusual feature, a “sinking hil

ig. 5). Other topographic forms found thin the valley systems are slump atures, stream meanders, floodplains d alluvial fans.

Evolution of landforms often relates the preglacial bedrock formations. ne Bearpaw and Eastend Formations, d locally the Whitemud and Frenchan Formations of Cretaceous age, and e Tertiary-aged Ravenscrag and Wood ountain Formations are exposed in e proposed natural area, and extenvely so in the badlands. The Ravenrag Formation is the capping stratum, sting directly upon the Eastend Foration or upon the Whitemud and enchman Formations, where these ve not eroded away. At elevations ove 3,150 feet the youngest Wood ountain quartzite sands, gravels and bbles cap the highlands.

g. 3. A view from the typical grassed uplands south of the badlands, looking north toward the teepee buttes. Only a few pasture trails provide access to the area.

Origin of the conical 'teepee buttes' of e badlands began with the running of rface water into vertical cracks in the nmarine Ravenscrag Formation and e wearing of these into ever-widening sures and gullies. Eventually the alterte weak and more resistant bedrock ata stand out in relief displaying inresting layer-cake erosional forms ig. 3). Formation bedding is further nphasized by variations in strata loration. This is well illustrated thin the Ravenscrag Formation where nite coals and carbonaceous shale ds ignite due to lightning. Oxidation the iron compounds through burning uses the change to salmon-orange and ick-red hues.

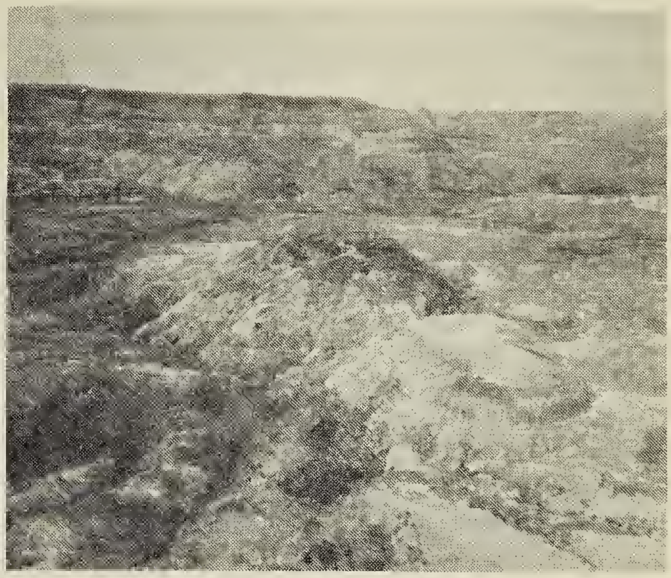


Fig. 4. The Killdeer Badlands, 8 miles west of Killdeer, showing the influence of erosion on the different strata. The degree of vegetation cover varies with slope aspect and steepness, soil type and moisture conditions.

The sinking hill consists of a 200-foot section from the center of a low hill that has broken away sharply from the rest of the hill and has allegedly settled nearly a foot a year since the early 1930's (Fig. 5). The Eastend sandstone and siltstone strata form the upper part of the sinking segment. Large concretions are embedded in the fine yellowish sandstone and siltstone walls. It is suggested that lateral stream erosion below the Bearpaw-Eastend contact may be the cause of the sinking process. Apparently Morgan Creek undercuts the stream bank west of the sinking hill, causing erosion of the Bearpaw shales. With progressive erosion, the block of ground adjacent to the creek shifts northwest

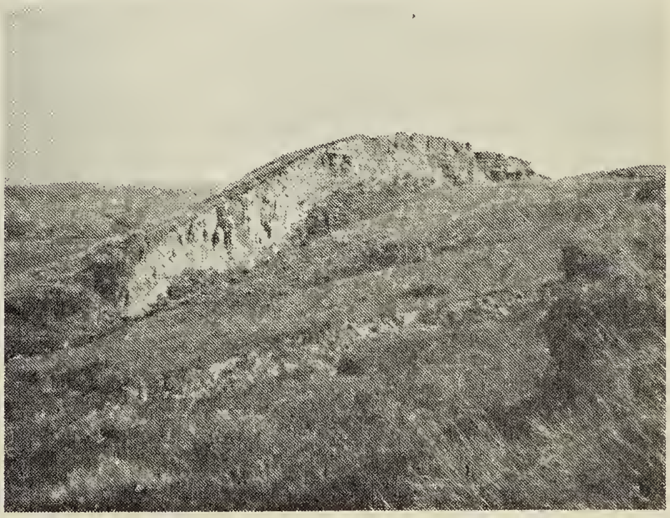
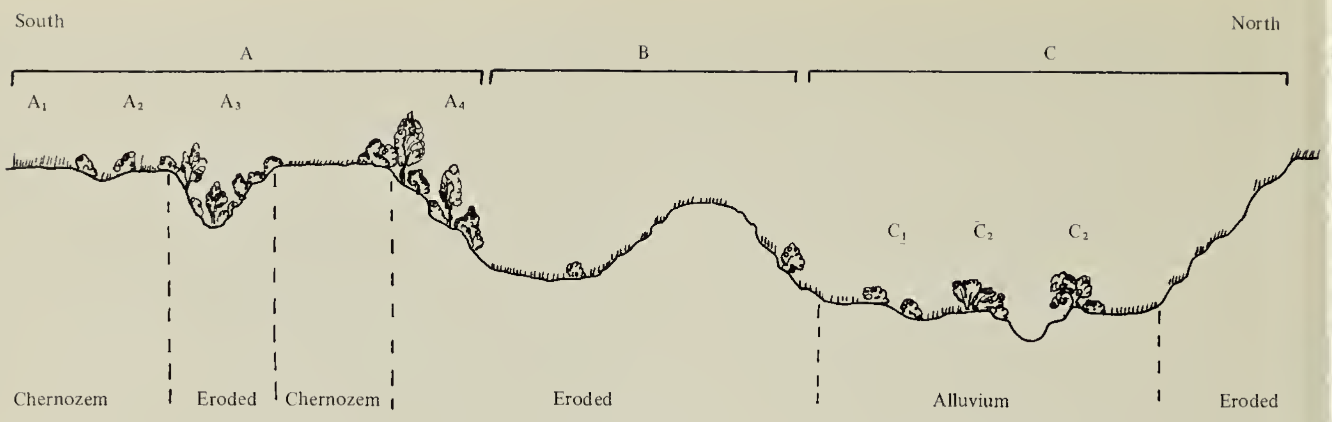


Fig. 5. A view of the sinking hill, looking northeast toward Morgan Creek, shows one of the near-vertical sandstone and siltstone walls and the down-dropped block. Rattlesnakes frequent the site.



Profile Letter	*Corresponding Landform*	*Soil Type*	*Associated Plant Community (Community Reference Number, see Table 1)*
A	Thinly-glaciated Plateau	Dissected Plateau Complex	1-6
A_1	Well-drained upland	Chernozem	1, 4, 5, 6
A_2	Upland depression	Chernozem	2, 3
A_3	Ravine	Regosol-eroded	15, 19, 20, 24
A_4	Dissected escarpment	Regosol-eroded	11, 15-19, 21-24
B	Badlands	Regosol-eroded	12-14, 21, 23
C	Valley Complex	Regosol-eroded, alluvium	5-11, 15
C_1	Alluvial flat	Alluvium – saline – burned – gleyed (wet)	7, 10, 11 5, 6 8, 9
C_2	Creek bank	Alluvium	15, 20

Fig. 6. A diagrammatic representation of the relationship between landscape, soils and vegetation in the study area.

laterally, removing the support for the overlying Eastend strata. Settling of these upper beds into the resulting chasm creates the sinking effect. An alternate explanation of the sinking process is that of the dissolution of underlying salt deposits to form a cavern into which the overlying beds settle.[8]

Associated with the bedrock formations are many features of paleontological interest. Fossilized bone fragments of fish, turtles, rodents, primitive deer-like forms, camels and three-toed horses have been found in the Wood Mountain gravels. One specific location, west of Morgan Creek in the southeast quarter of Section 2 of Township 2, Range 5, West of the Third Meridian has been reported. In the Frenchman Formation of the badlands, bones of the three-horned dinosaur (*Triceratops*), and fragments of turtles and crocodiles have been discovered. The underlying Eastend Formation contains plesiosaurian bone fragments.

Landscape — Vegetation Relationships

The plant communities dominating this landscape fall readily into four habitat groups: grasslands of neglible salinity (Figs. 3 and 7), grasslands of t alluvial flats — saline or wet (Figs. and 9), barren, eroded and gravelly ou wash areas (Fig. 4) and woodlands moist protected draws, depression ravines and creek banks (Fig. 10). detailed portrayal of the relationsh between vegetation communities an landscape is presented in Fig. 6 an Table 1.

Various grasses representatives of t Short-Grass Prairie Region domina the plant community spectrun Associated with the better grazing are are spear grass (*Stipa comata*), blu grama grass (*Bouteloua gracilis*), Jun grass (*Koeleria cristata*) and sedge (*Carex filifolia, Carex eleocharis* Found in less abundance are whea grasses (*Agropyron* spp.) and bluegrasse (*Poa* spp.). Drier sites of gravell uplands and southern exposures, an heavily grazed areas are characterize by an increased abundance of pastu sage (*Artemisia fridida*), moss phlo (*Phlox hoodii*), little club-mos (*Selaginella densa*), prickly pear cactu (*Opuntia polyacantha*) and pincushio cactus (*Mammillaria vivipara*). Patche of snowberry (*Symphoricarpos occider* le 1. The dominant plant communities and corresponding community reference numbers (see Fig. 6) for the Wood Mountain-Killdeer Badlands Natural Area.

Community Reference Number	Plant Community
1	*Stipa comata, Bouteloua gracilis – Koeleria criststa, Carex* sp.
2	*Poa* sp. *Agropyron* sp. – *K. cristata*
3	*Poa* sp. – *K. cristata* – *Carex* sp.
4	*B. gracilis* – *Plantago purshii*
5	*Agropyron smithii* – *Polygonum aviculare* – *Carex* sp.
6	*Artemisia frigida, Phlox hoodii* – *Selaginella densa*
7	*Distichlis stricta* – *Puccinellia nuttalliana*
8	*Eleocharis* spp. – *Carex* – spp. – *Juncus balticus*
9	*Scirpus americanus* – *Carex praegracilis* – *Juncus balticus*
10	*Hordeum jubatum*
11	*Atriplex nuttallii*
12	*Astragalus triphyllus* – *Hymenoxys richardsonii* – (*Haplopappus* sp., *Carex filifolia, Gutierrezia diversifolia,*
13	*Eriogonum multiceps* – (*G. diversifolia, Eriogonum flavum, Lesquerella alpina, Haplopappus* sp.)
14	*Sarcobatus vermiculatus* – *Chrysothamnus nauseosus* – *Artemisia* spp.
15	*Symphoricarpos occidentalis* – *Rosa* sp., *Elaeagnus commutata,* (*Salix* sp., *Potentilla fruticosa, Shepherdia canadensis, Ribes oxyacanthoides*)
16	*Populus tremuloides* – *Shepherdia argentea* – *Amelanchier alnifolia*/*Rosa* sp.
17	*Fraxinus pennsylvanica* var. *lanceolata*/*A. alnifolia* – *Prunus virginiana* var. *melanocarpa* – *Cornus stolonifera*
18	*S. argentea* – *F. pennsylvanica* var. *lanceolata*/*Juniperus communis*
19	*P. virginiana* var. *melanocarpa* – *A. alnifolia, Rosa* sp. – *R. oxyacanthoides, S. occidentalis*
20	*Salix* spp., *Shepherdia argentea*
21	*Juniperus horizontalis, J. communis* – *E. commutata, S. canadensis, P. fruticosa, Arctostaphylos uva-ursi*
22	*Crataegus* sp.
23	*Artemisia* spp. *R. oxyacanthoides, S. occidentalis, Rhus trilobata, Rosa* sp.
24	*Prunus pennsylvanica* – *P. virginiana* var. *melanocarpa, Crataegus* sp., *A. alnifolia*

s) and rose (*Rosa* sp.) occupy the ssland depressions (Fig. 7).

Characterizing the alluvial flats are rsely-growing salt-tolerant grasses l herbs. Most notable are alkali grass *istichlis stricta*) and salt-meadow ss (*Puccinellia nuttalliana*), but also resented are foxtail barley (*Hordeum atum*) and salt sage (*Atriplex nut- ii*). Sedges (*Carex* spp.), bulrushes *irpus* spp.), spike rushes (*Eleocharis* .) and wire rush (*Juncus balticus*) are ociated with the freshwater creeks, nds and springs (Fig. 9). Wolf-willow *aeagnus commutata*), buffalo-berry *epherdia argentea*), willows (*Salix* .), snowberry and rose are oc- ionally found in alluvial locales.

Vegetation cover in the badlands and er eroded and outwash areas is quite nt, many of the steeper slopes being re (Fig. 4). Creeping juniper *niperus horizontalis*), ground juniper *niperus communis*) and bearberry *rctostaphylos uva-ursi*) form mats er some of the clay slopes. Cushion lk vetch (*Astragalus triphyllus*), lorado rubber plant (*Hymenoxis hardsonii*), umbrella plant *iogonum flavum* and *Eriogonum multiceps*), broomweed (*Gutierrezia diversifolia*), spatulate bladderpod (*Lesquerella alpina* var. *spathulata*) and spiny ironplant (*Happlopapus* sp.) are commonly represented. Greasewood (*Sarcobatus vermiculatus*), rabbit-brush (*Chrysothamnus nauseosus*), skunk-bush (*Rhus trilobata*) and various sage species (*Artemisia* spp.) are widespread.

A number of woody perennials are confined to the moist and sheltered coulees, draws and depressions (Fig. 10). Tree species include trembling aspen (*Populus tremuloides*) and green ash (*Fraxinus pennsylvanica* var. *lanceolata*). The shrub-tree association is further characterized by buffalo-berry (*Shepherdia* spp.), saskatoon (*Amelanchier alnifolia*), chokecherry (*Prunus virginiana* var. *melanocarpa*), gooseberry (*Ribes oxyacanthoides*), dogwood (*Cornus stolonifera*), shrubby cinquefoil (*Potentilla fruticosa*), hawthorn (*Crataegus* sp.), wolf-willow, snowberry and rose.

Fauna

Barring species which are known to be already extinct in Canada, the Wood Mountain physiographic region con-

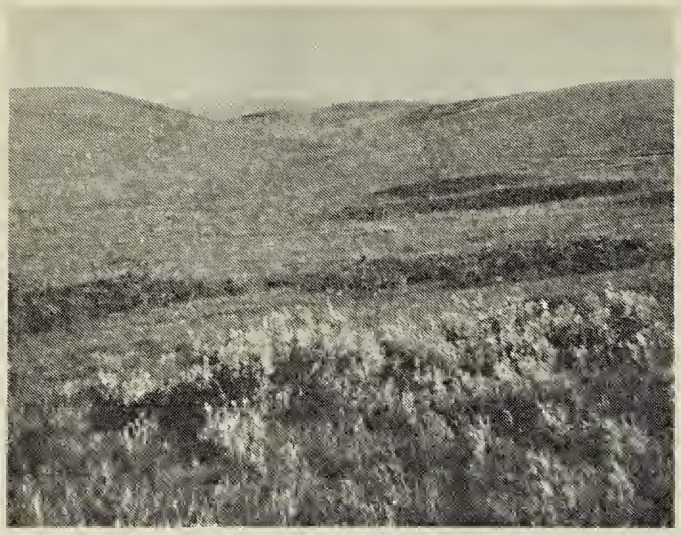


Fig. 7. The greatest development of the dominant grassland habitat occurs on the undulating uplands. Moist draws and depressions are characterized by snowberry, rose and scattered sagebrush.

tains a complete sample of prairie fauna. Many species are or could be regular residents of the proposed Killdeer Badlands Natural Area.

Located along the Frenchman Valley riverflats to the west are the only black-tailed prairie dog colonies in Canada. When not persecuted, this species has the ability to colonize new areas. To eliminate prairie dogs would be to eliminate numerous species which depend directly or indirectly upon them for their existence. These include the burrowing owl, ferruginous hawk, golden eagle and rattlesnake still found in the area, the kit fox, now considered rare or absent, and the black-footed ferret, extinct in Canada, but still found in the United States.

Re-establishment of near-extinct or vanishing populations is considered feasible. Reintroduction of the kit fox and ferret depends entirely upon a healthy prairie dog population. In view of the historical association of the area with bison herds, their reintroduction and management has been recommended as a desireable undertaking.[9] The plains wolf and plains grizzly, once predators of the bison are now extinct.

A few mammalian species of interest to sportsmen are native to the proposed natural area. Mule deer are common, but recent figures released by the Department of Natural Resources (DNR) indicate this area to have one of the lowest densities of any survey zone in southern Saskatchewan. Pronghorn a telope surveys show their populati densities to be slightly lower than oth nearby areas and of minor importan compared to the Maple Creek-Cra Lake area. According to the DNR "A telope population trend survey" f 1972, the provincial antelo population shows a downward tre and a density well below the long-ter average. Protection of a nucle population would prevent this speci from becoming locally endangered an serve as a source of supply for surrou ding areas. Other mammals represente are the white-tailed jack rabbit, Nu talls's cottontail, Richardson's groun squirrel, coyote, red fox, skunk, po cupine, bobcat and badger.

Several rare or endangered avia species are regular breeders within th proposed park area. The Prairie Falco Golden Eagle and Ferruginous Haw threatened by widespread pesticide us habitat destruction and other pe secution, nest in or near the Killde Badlands as do the Turkey Vultur Burrowing Owl, and Long-bille Curlew. The Sage Grouse, largest North American grouse and well-know for its strutting and booming displa during spring courtship is a permane resident. Due to the destruction of i natural prairie habitat, few substanti populations remain.

A number of species, unique to th semi-arid grassland environment a

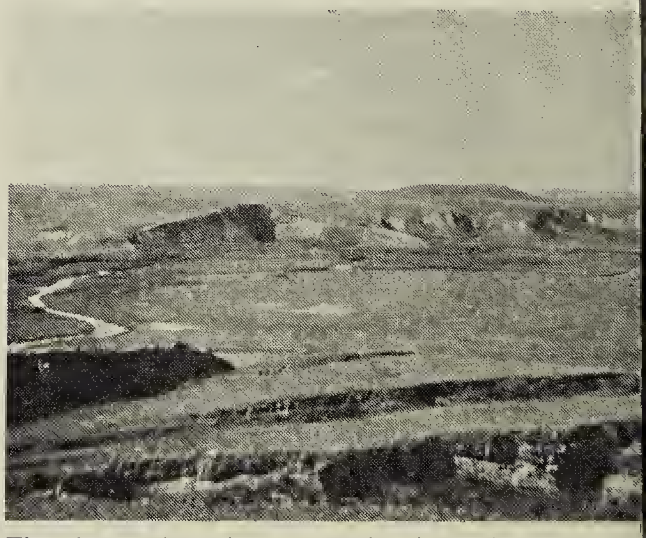


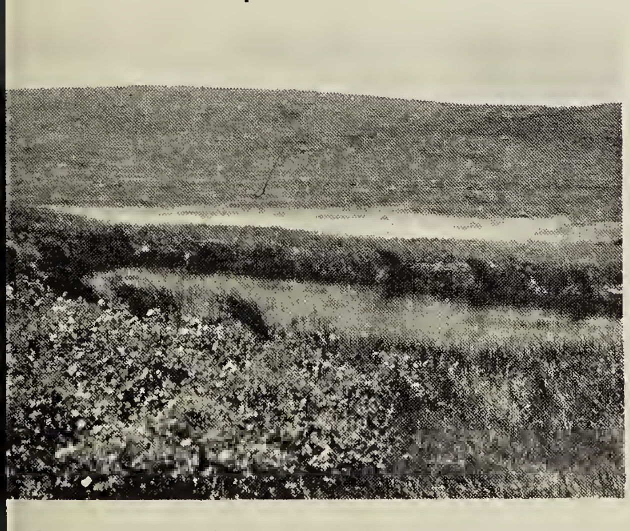
Fig. 8. A view from the sinking hill, northe across the Morgan Creek Valley shows posed valley slopes and a meanderi creek. Moist meadows, saline patches a wooded creek banks are associated with t alluvial flats.

ach the northern edge of their range hin this area.[4] Chief among these are Poor-will, Sage Thrasher, Brewer's ırrow and Rock Wren. The discovery Violet-green Swallows nesting in the tes along the Frenchman River in 55 makes this area the only known ation in Canada east of the Rockies ere the species breeds. The discovery Mountain Plovers immediately west the proposed park raises the ssibility that they may yet be found eding within the area.

The area's fauna is further diversified five snake species: the plains garter, stern hognose, bull snake, yellowlied racer and rattlesnake. Also ocring in the vicinity are snapping tur. The horned toad is known to be nd within the proposed national k boundaries, but is generally restric to the southwestern Saskatchewan l Alberta vicinity, adjacent to the Innational Bounday.

nservation Problems And nagement Suggestions

'he proposed Killdeer Badlands tural Area contains a representative ıple of the diverse short-grass prairie sical conditions and a near complete ge of the native prairie life forms still sting in Canada. An area of great ural beauty, its openness and exlent vantage points allow one to wits a scene similar to that experienced the first explorers and settlers. Features of geological, paleontological, biological, archeological and historical significance contribute to its suitability for interpretation of natural history in a prairie setting. Since it is also of sufficient size to sustain a good sample of the prairie environment, the area has high education and research potential. To fulfill its potential for present and future generations, it must be properly protected and managed.



. 9. Local saline areas and small marshes haracterize the temporary ponds, creeks nd springs. Blooming rose bushes and noisture-loving grasses, sedges and rushes urround this upland pond.

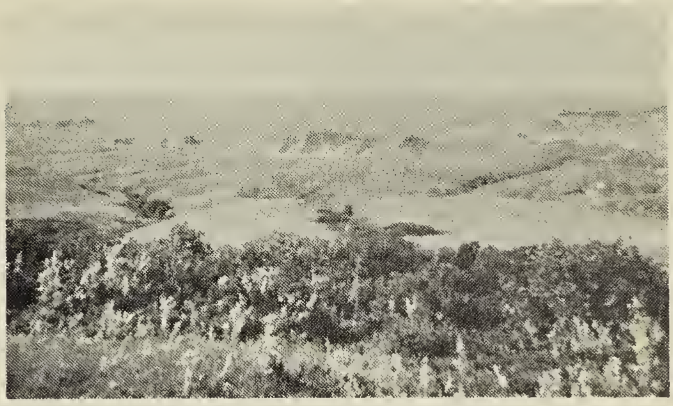


Fig. 10. Moist wooded north-facing slopes and sheltered draws are dominated by green ash with a varying understory of chokecherry, saskatoon, wolf-willow, buffalo-berry and dogwood. Fringing the grasslands are wolf-willow, snowberry and rose.

In the past, much attention has been given to arguments supporting the need for a clearly defined protected area system into which the preservation of a natural area network could be rationalized. Such natural areas will have to be justified in relation to broad land-use planning, considering such needs as space for living, recreation, environmental conservation and economic development. Now it appears that this concept has finally caught on and that increasing pressures are being applied to the authorities for better natural resource protection. Since 1969, the IBP-CT has encouraged the provincial government to provide leadership in its planning by establishing some model Natural Areas, representing different types of terrain. The object is to protect, first, on a trial basis and, later, if successful, on a permanent basis, native areas representing dominant ecosystems and unique habitats for the purposes of aesthetics, science, research and education. The Killdeer Badlands area was rated highly in the original IBP-CT recommendations.

Management of natural areas poses another problem, one of extreme importance. Since the areas will vary in size, composition and vulnerability, each should have a general management plan. Management criteria are needed to protect the features of particular value. Prior to the formulation of the plans, each area proposed for protection should be identified as to its purpose and objectives and these should be reflected in the final boundary proposals. If an area is large enough, zoning is an acceptable management procedure to rationalize conflicting needs. Ideally a portion of the landscape should be left upon which to observe successional trends in the absence of manipulative management.

Management plans for the Killdeer Badlands area will be influenced largely by the fragility of and the extent of visibility within this open environment. Construction activities often cause extensive soil erosion, a significant factor particularly in the semi-arid grasslands where high winds and slow vegetation growth are typical. For this reason, decisions relating to the number of physical improvements to be allowed within or near the area are important. This pertains primarily to roads, trails, turn-offs, look-outs, parking lots, campsites and fences. An attempt to harmonize these features with the landscape, taking advantage of topographic changes and changes in alignment and view has been suggested. Treatments to minimize dust, and sodding of bare areas such as ditch-cuts, are possible solutions to the erosion problems.

Special attention must be given to the amount and nature of publicity given to natural areas, for an overabundance of people can severely modify them, limiting their values for research and education purposes. The location and number of facilities should be dictated by the recommended carrying capacity for each area. Development of part of an area for interpretive purposes, explaining its sensitivity, reasons for preservation and restricted recreational use would be advantageous.

For the proposed Killdeer Badlands
Natural Area, an interpretive progr
unique in Canada could be formulat

Policies must also be adopted reg
ding fire, disease and insect infestati
control, species introductions, obs
vational or manipulative experimen
and educational use, hunting or oth
control of wildlife populatio
agricultural practices of reseedi
spraying, mowing, grazing, clearing a
drainage changes, mineral and oil
ploration and extraction and tra
mode and limitations.

Summary

On the basis of field studies conduct
by IBP-CT, the Killdeer Badlands ha
been given a high priority in recomme
dations to the Government of Sask
chewan for model Natural Ar
establishment. This paper provides
preliminary description of the ecolo
of the area with specific references to
ceptional features of interest. Using it
an example, some of the problems whi
could arise in protecting Natural Are
are identified and possible managem
practices for the future suggested.
opportunity to experience natur
history in the prairie setting exists n
in southwestern Saskatchewan. If fut
generations are to receive simil
benefits, it is our responsibility
provide proper protection a
management of a prairie landsca
representative. Would not the propos
Killdeer Badlands Natural Area fulf
the requirements well?

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INTERPRETIVE PROGRAM

askatchewan Department of Natural Resources

by ROBERT J. LONG*

As the administrator of Saskat- ewan's renewable resources, the epartment of Natural Resources has ng had an interest in environmental ucation. Provincial Parks have been anned with this in mind, Hunter fety programs have attempted to im- ove the behaviour of sportsmen, and nservation Information Service blications have attempted to keep sidents informed on resource develop- ents. The Museum of Natural History Regina is a division of D.N.R. whose tire function is to disseminate infor- ation on Saskatchewan's natural and storical heritage.

In recent years, the dramatic upswing interest in education out-of-doors has rced the department to step up its ograms. One of the most significant velopments has been the expansion d consolidation of the Interpretive ogram, which had previously existed a series of independent trails and hibit centers in our Provincial Parks. is project has been assigned to the In- rpretive Services Section of the Museum of Natural History.

The Interpretive Program is still a long way from being 100% operational, but progress is being made. Existing facilities are being upgraded, and new services are developed each year. We are now working on an over-all "master plan" which will provide guide-lines for future development. Ultimately we will see a far-reaching program that deals not only with nature-study topics, but also subjects within the realm of human history and resources management. Provincial Parks will continue to be the centers of development, but facilities will also be developed on D.N.R. lands where conditions and local interest warrant.

The Interpretive Program is intended to provide facilities and information that will encourage residents and visitors to look at and understand their surroundings within the parks, and after they leave.

There are four elements to the proposed program, including Nature Trails, Nature Center Exhibits, Naturalist Programs, and Publications. Each of these is an essential part of a

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askatchewan Museum of Natural History, gina, Saskatchewan.

Sask. Gov't. Ph

Young naturalists examine an old bear den along Duck Mountain's Red Squirrel Nature Tra

well-rounded program, but the needs of each area will determine which elements predominate.

Nature Trails are and will continue to be the most common facility in our Interpretive Program. In laying out a trail, we strive to find an easily travelled route of one to two miles that winds through and past a variety of habitats. Standards have been developed that will ensure that the route will be enjoyable and safe for young and old. Two systems of interpretation are in use. One employs a series of numbered markers, and a printed guide sheet which discusses features at each station. The second method, which is to become standard for well-established trails, utilizes small printed signs placed along the route. These signs discuss features close at hand and free the trail user from the encumbrance of a printed sheet.

Nature Center Exhibits are intended to supplement and enhance the interpretation that is presented along the nature trails. They may be no more than small decorative exhibits such as are presently situated in the Trans-Canada campsite offices, or they may constitute an in-depth interpretation of a regior natural history. In all cases they serve whet the visitor's appetite, and provi additional interest to the program.

This year, for the first time, season naturalists will be assigned to Cypre Hills, Meadow Lake, and Duck Mou tain Parks. These people will offer program of campfire talks and guid nature hikes throughout the spring ar summer. In addition they will carrying out more intensive resear into the area's natural history, so th the entire Interpretive Program can continually upgraded. Naturalists w be encouraged to try new and differe activities to add variety to the progra as a whole.

Special publications will provi reference material and take-hon mementos. Many will be intended round out the program, filling in a ditional information about the area. Buffalo Pound Park the theme of t exhibit center will be "The Bison ar Man". A publication of the same tit will delve into the natural history of t plains bison, and its relationship wi Indians, Metis, and white man.

In smaller parks a brochure or oklet may comprise the entire nature terpretive program. At Goodspirit rk, for example, the terrain of the nd dunes is not conducive to the yout of a nature trail, so we have epared a booklet entitled "Exploring e Dunes". This will encourage visitors explore on their own — and look for e various features discussed.

A series of publications on the "Ex- oring" theme is planned. "Exploring Aspen Forest" will provide a guide the plants and animals that a visitor ay find in an aspen bush, under logs, tree trunks, in leaf litter, etc. Even- ally there should be a similar blication for each of the major types habitat found in Saskatchewan.

At the present time there are six ture centers and 11 nature trails that e operational in nine parks. In ad- ion, there are exhibits at La Ronge, d at Trans-Canada campsites at oosomin, McLean, Besant, and Maple eek. One additional trail is located the Waskwei River protected area, rth of Hudson Bay.

ick Mountain Park

The Red Squirrel Nature Trail has en operating for several years, and esently is our only trail using the etal signs that will become standard roughout. It is a 3/4-mile walk rough predominantly coniferous rest. The Whitethroat Trail, opened in 72, is a slightly longer route which ns through aspen forest and partially ong the shore of Madge Lake.

The Duck Mountain Nature Center as opened in the spring of 1972. The hibits illustrate a few of the common d interesting species but, more impor- ntly, they attempt to explain the for- ation of the highlands, the climate, d some of the ecological processes at make the area interesting.

eadow Lake Park

The Jack Pine Nature Trail was ablished in 1971, during a summer of rly intensive research in this park. It a route of 1.5 miles that passes ough a mature Jack Pine forest and across a recently logged area. On the return route visitors pass an active beaver-cutting operation and the nest of a Goshawk. Interpretation is given by a printed guide sheet available at the park office.

Cypress Hills Park

A small nature center exhibits a few of the interesting species found in this unique area, and also gives a brief discussion of geological history. This center will be closed in 1973, with the opening of a new visitor center which includes a large exhibit hall. Some of the new exhibits will be completed at that time.

Two nature trails are operating in the park. The Valley of the Beavers Trail features a chain of beaver ponds of various ages, some active and some abandoned. The Valley of the Windfalls Trail leads through a forest of large conifers. Guide sheets have been used to the present time, but plans are to have interpretive signs in place this spring.

Moose Mountain Park

The Blue Heron Trail has been operating off and on for a number of years, and in 1972 a formal guide sheet was prepared. The trail is a 1.5-mile route through typical Moose Mountain aspen forest; it skirts a number of small lakes. It also passes a recently abandoned Great Blue Heron colony.

Greenwater Lake Park

This park has a nature center with exhibits depicting common wildlife in the park. In association with the center, the short Hazelwood Nature Trail follows the banks of a small stream. At Marean Lake a panel exhibit explains life in a heron colony, one of which can be seen across the Lake.

Pike Lake

A small nature center and short trail have been open for several years. Plans for expansion of the trail have been developed, and expansion should be accomplished early in 1973. A guide sheet for this "Veery Nature Trail" will be prepared at that time.

Buffalo Pound Park

A spanking new exhibit room has recently been added to the park entry office, and the major exhibit is very nearly complete. The theme of the center's exhibits will be "The Bison and Man", and the major exhibit is a life-sized replica of a buffalo pound, with a huge bull just entering the crude corral.

The Buffalo Coulee Nature Trail is a half-mile route starting from the Maple Vale Campground. It follows the bottom and side of a ravine, and features the typical flora and fauna of these important wildlife refuges. The Big Valley Trail is longer; it descends into a wide valley that runs down to Buffalo Pound Lake.

Battlefords Park

The Wintergreen Trail is a tribute to park staff who have independently developed this excellent trail. The 3/4-mile route leads up a forested coulee, and returns across a prairie hilltop. On-site interpretation is presented by typed labels protected by wooden "flip-boards".

Condie Nature Refuge

For the past three years season naturalists have provided group tour guided walks and other programs f groups visiting the refuge. Many priva groups and hundreds of school childre have been able to take advantage of th service.

The Nature Center Exhibits explai the glacial origin of the Condie terrai and discuss the natural and huma history of grassland and marsh.

The Boggy Creek Nature Trail ru along the valley of this slow-movi stream. Interpretive panels give adde information on subjects of interest.

Much still needs to be done to bri about the kind of Interpretive Progra that we all would like to see. With th continuing support of the Natur History Societies, school teachers an Outdoor Education Associations, w should be able to develop a program i Saskatchewan that rivals the finest th exists anywhere. We're working on it!

PEST CONTROL

by MAURICE E. TAYLOR*

Over the past several years people have become increasingly aware of environmental concerns regarding the use of chemical pesticides. Reaction to this concern has resulted in much anxiety and confusion for the general public and the homeowner in particular. The homeowner now feels that he is confronted with a dilemma: can he safely combat pests in and around his home and property without hazard to himself and the environment, or must he stand by and watch insects and other pests ruin his garden and the landscape?

While this concern is understandable, the situation really is not that serious. Home ground plantings of ornamentals, fruits and vegetables can safely protected from serious pest inju by good management practices and, necessary, by the proper use pesticides that have little or no harmf effect on the environment.

The number of non-chemical metho used to manage or control pests can as numerous as the people involve Many gardeners have their own "pe methods that may work well for the but not prove satisfactory to others. T following are a few effective and pra tical management practices that he prevent or reduce damage from gard pests:

(1) *Resistant plant material* — Alwa

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*Research Station Canada Agriculture, University Campus, Saskatoon, Saskatchewan.

ow varieties of fruits, vegetables and
namentals that are recommended for
ur area by provincial horticulturists.
any of the recommended varieties
ve some resistance to pests or, because
ey are adapted to the area, are better
le to tolerate moderate infestations of
sects or plant diseases.

(2) *Cultural methods* — Use cultural
actices that provide plants with the
est growing conditions possible.
igorous, healthy plants are less likely
suffer pest injury. Weeds should be
iminated by timely tillage because they
ot only rob moisture but may harbour
sect pests and plant diseases.
nitation is very important. Plant
ebris may contain overwintering in-
cts or disease organisms and should
erefore be removed from the garden in
e fall or buried or used in a compost
le. Wherever possible, rotation of gar-
en crops is a good practice. Potatoes in
rticular should not be grown on the
me soil two years in succession.

(3) *Mechanical control* — The use of
echanical devices such as barriers,
aps, nets and even hand collection of-
n offers quick and positive results. The
ome gardener with relatively few plants
n put to use a number of effective and
onomical methods of this kind. Card-
oard or metal collars placed around
ansplants will prevent cutworms from
tting off the plants. Hand picking of
terpillars of various kinds — horn-
orms, woollybears, armyworms, etc. —
ten can be just as practical as using an
secticide. Slugs can be trapped and
llected under pieces of board or bark.

(4) *Biological control methods* —
atural control forces including
rasites, predators and pathogens play
important role in keeping insects un-
r control. Birds should be encouraged
d predatory insects such as ground
etles and ladybird beetles should not
killed. The practice of importing
dybird beetles and praying mantis for
lease in gardens has not proven very
eful; however, native ladybird beetles
ten become abundant enough to play a
gnificant part in controlling aphids.

Naturally-occurring bacterial and
ngal diseases of insects only occasionally result in effective control of infestations. However, one bacterium, *Bacillus thuringiensis*, has been propagated by man and can be applied on gardens and other crops to control several kinds of caterpillars without hazard to man or wildlife. It will be available commercially in Canada this year.

Control with Pesticides — There are times when non-chemical methods of control do not perform as expected and pest epidemics may develop in spite of the gardener's best efforts. An insecticide may then be required to bring the pest population down to a tolerable level.

The objective of control should be to reduce the population to a non-epidemic level, not necessarily to eliminate it. It should be remembered that not all insects are pests; in fact, many of them are beneficial. Pesticides should be used with discretion, therefore, and directed as far as possible only at the pest species.

The choice of pesticides should be limited to those with moderately low human and animal toxicity so that they can be used safely on gardens and around the home. They must also possess another essential characteristic: the ability to degrade or break down into non-toxic substances soon after application. Such degradable products do not affect the environment adversely.

Among the readily available insecticides and miticides that have these characteristics and are recommended for use in Saskatchewan gardens are: carboryl, diazinon, kelthane, malathion, methoxychlor, pyrethrins, and rotenone. The chances of adverse hazards arising from the proper use of such pesticides is nil.

Integrated control — A method widely used in the solution of pest problems is integrated control. This is the judicious use of a combination of non-chemical or management practices and pesticides. This technique appears to offer the best solution to pest control with the least adverse effect on the environment.

NIGHTHAWKS

In The City

by JAMES A. WEDGWOOD*

Although few native birds thrive in man-altered environments, others have spread into previously unoccupied regions and some species concentrate in prairie town and cities. Such artificial habitats seasonally harbor better than 10 regularl breeding species, including the Common Nighthawk. It doesn't necessarily follow however, that larger broods are raised in cities than in natural areas.

With the Nighthawk, the time for incubating and fledging is about 43 days compared to an average of 25 days for the small passerines (perching birds) commonl nesting in cities and towns. [1 4 5 6 7 8 9 12] . Partly offsetting this seeming disadvantage is the young Nighthawk's greater flight power when it leaves the nest site Excepting swallows and martins, young passerines we have seen departing the nes lack the ability to maintain level flight, let alone gain altitutde. The Nighthawk ca gain altitude on its first sortie, an obvious advantage as many nest sites adjoin bus streets.[4] However, as the site is usually a roof, some preliminary flying may be don along it prior to the initial sortie.

Most urban-dwelling native birds nest in bushes and trees rather than in or o man-made structures. The Nighhawk is an exception. Most of its nests, if one ca call them that, are on flat roofs — perhaps the safest place in town for protectio from earth-bound predators, and maybe also safest from aerial predators, which ar uncommon over the city during the breeding season. Another interesting characteristic is the location of the nest site. Of the native birds breeding in Saskatoon only the Nighhawk concentrates in the downtown district, rather than in residenti areas. Of the more than 300 birds indigenous to Saskatchewan, the Commo Nighthawk is the sole species attracted to the city core — which doesn't infer muc for downtown as habitat: suitable for just three animals, Nighthawk, rat and ma (and people are questioning the last).

The key to the location of the nest is the flat gravelled roof, a characteristic o cities. It reproduces the primary features of the bird's natural nest site, a generall flattish, largely vegetation-free, open locale.[10]

Study Area

Our main objective in our little study in the summer of 1971 was to estimate th number of breeding pairs of Common Nighthawks and their distribution within th limits of the City of Saskatoon. The variety of areas offered some interesting comparisons of occupancy by Nighthawks:

SUTHERLAND, once an independent town, now incorporated, is still isolate from the rest of the city by university farm lands and a highway right of way. I retains the physical characteristics of a large prairie town.

FIELD A is essentially in its original state. The soil is gravelly with numerou stones and boulders on the surface and the vegetation consists of short, sparse cove with a few small scattered patches of stunted poplars and bushes. There are n buildings in this field which is in the northeast rim of the city. None of the othe open fields within the city limits have these surface conditions, and cursory check indicated that only Field A had nighthawks on range.

The NORTH INDUSTRIAL AREA has a number of buildings with flat roofs bu most of the area is ground surface, much of which is devoid of vegetative cover. I has few trees.

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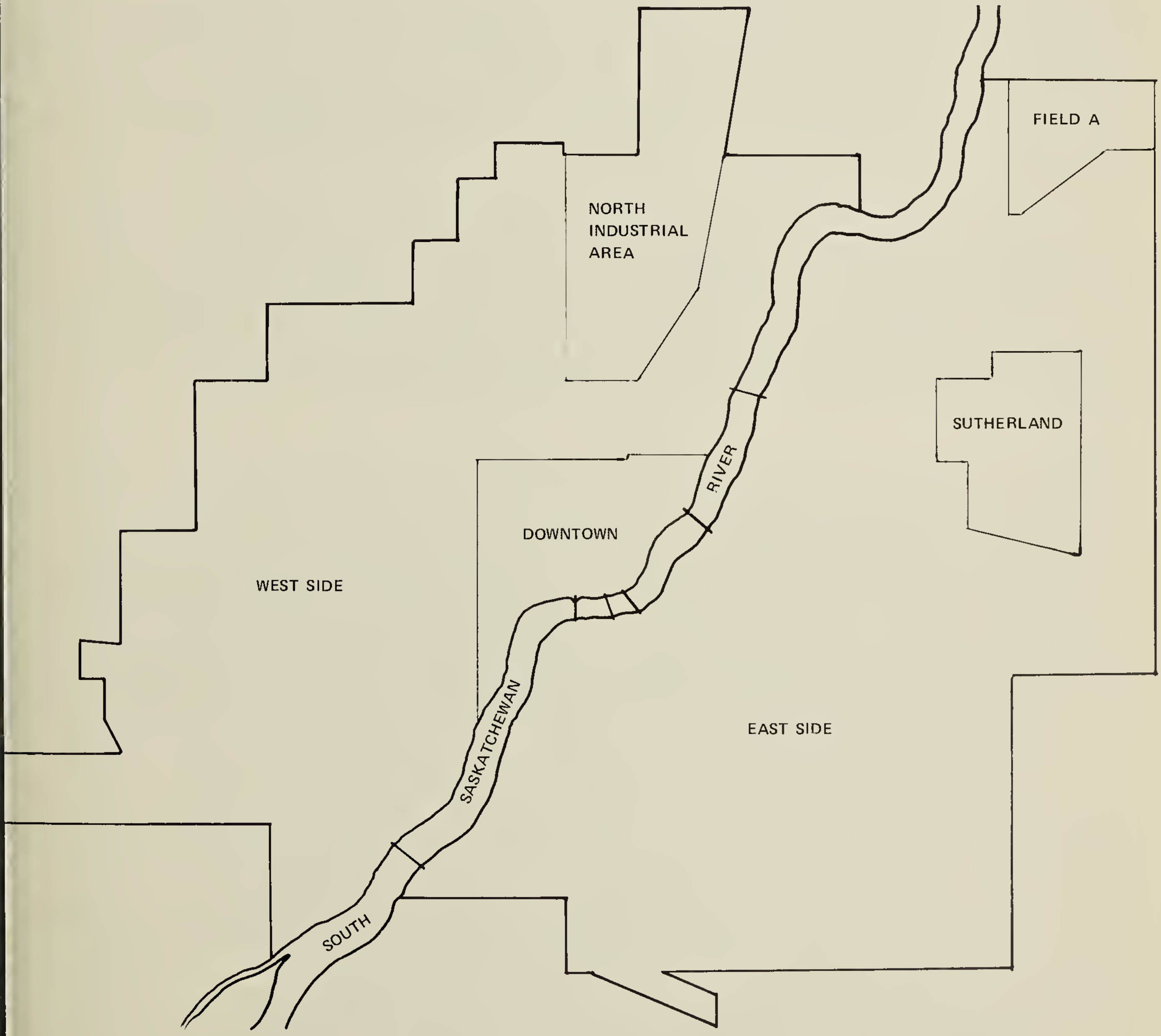
DOWNTOWN was that area containing Nighthawk home ranges adjoined on at ast two sides by other ranges, that is, where the concentration of birds was the eatest. This was the district bounded by 19th Street, Spadina Crescent, Queen reet (28th Street) and Avenue J. It is flanked on the east and south by the South skatchewan River. The area is largely commercial, with some institutional, light dustrial, warehouse and apartment buildings and, therefore, numerous flat roofs. here are some pockets of older housing and a few small open areas. Except for veral blocks in the core and a recently redeveloped area, it is reasonably well eed.

EAST SIDE is the City east of the South Saskatchewan River, excepting utherland and Field A.

WEST SIDE is the district west of the River, excepting the Downtown and North dustrial Areas. Here and there on their outskirts are large fields that, as noted reviously, were devoid of Nighthawks. Except for these undeveloped parcels, the vo are similar to other prairie residential suburbs: mostly housing, including apart- ents, with some commercial and institutional sites. Typically, the majority of the partment and commercial buildings have flat roofs.



ap of Saskatoon showing areas used in 1971 Nighthawk survey.

On the Sources of the Observations

Remarks about the occurrence of Nighthawks are largely based on observations my wife and I made mainly between June 19 and August 27, 1971. Other observations were kindly provided by Mrs. J. B. O'Neil, Miss L. P. Strom, J. Frank Roy Stan J. Shadick, Jim D. Hogg, Wayne C. Harris and by J. Bernie Gollop who also gave us helpful suggestions. Some reference was made to the Saskatoon Natura History Society's bird survey of 1966-70, especially reports by W. S. Richards.

Random sightings by ourselves and others in the course of ordinary travels around town yielded a general picture on the number and location of birds and, in a few instances, pointed to centres of activity and to range boundaries. In our case modest adjustments in routes and times considerably extended the coverage.

However, did a Nighthawk in one block one night and in the next another time mean one male or two? Were birds being missed in the random coverage? Answering these questions meant surveying the whole town, driving at slow to moderate speeds wherever possible on parallel routes two or three blocks apart. We listened for "peent" calls and stopped where necessary for good soundings. The city was covered twice — sounds like a tall order but it wasn't, three nights sufficing for each of the two big districts. A few doubtful places were visited three times. The survey essentially completed the picture on the birds' whereabouts and provided further delineation of home ranges.

Downtown was then checked by traverses one block apart driven at the highest practical speed (the DARL technique: "damn, another red light"). Though Nighthawks can be swift, the male aloft and "peenting" meanders and hesitates so much his actual course that speed is usually quite low. If the traverse was made with dispatch and attention paid to the direction from which sounds came, one could differentiate between birds. To offset the risk of missing a bird, traverses were repeated when traffic was light.

Plotting the results of the one random and two more or less systematic surveys on a map showed places where it was unclear whether one or two ranges existed. These were resolved by going to likely lines of demarcation between ranges and making direct observations. Ten minutes was usually enough if birds were active. As this technique was less successful among taller buildings in the core of the Downtown area, it was used there in only a few cases.

Results

There were about 48 Nighthawk home ranges within the City limits, distributed among the six districts as shown in Table 1.

Downtown had the greatest number and density of birds. On a good Nighthawk evening they could be heard every second or third block. Why this concentration where there is such a large amount of building, concrete and asphalt, and where vegetation is minimal? The initial guess, proximity to the river bank for food supply did not fit the facts. Density was as great away from the river as near it. Size of home range precluded colonial nesting — the Common Nighthawk is known also to nest in both colonial and semi-colonial situations, but the nests then are yards, not blocks, apart.[4] [11] Territorial defense seemed to be absolute in the few instances of boundary challenge seen; Nighthawks were not observed to cross territorial boundaries. No corresponding concentration existed on the opposite side of the river Furthermore, only twice was a bird seen or heard over the river during the height of the breeding season. The growing suspicion that the concentration downtown was mainly due to the number of flat roofs available for nest sites was confirmed when we read J. T. Armstrong's report of a similar study in Detroit.[3] His conclusion: density of flat roofs is the primary factor in the selection of home ranges; large trees for day-roosting by males and vegetation for the production of flying insects for food are of secondary importance.

Tall buildings may not be preferred nest sites — at least four of the nest sites were ıot on the highest roofs in the ranges.

A nest was found on the ground on railway right-of-way within the city in 1964, ınd a home range existed there in 1971. Yet a short distance beyond this range in wo directions were flat-roofed buildings in unoccupied areas.

Initially, a bird near our home was used as a signal for a Nighthawk night, and vhen he became active we juggled some surveying into our plans. Later we found he vas an unreliable indicator for the Downtown area, as birds there could be quite active when more isolated males were not. A density or crowd excitation factor seemed o be at work. A similar circumstance was observed in Field A. Arriving there at arly dusk once, we found all the birds down. We flushed one, which climbed aloft, iving its "peent" call; within moments all five males were up and "peenting". This ird, incidentally, roosted in a slight declevity on top of a rock.

What makes a "good" Nighthawk night — meaning most of the birds call for a onsiderable period? We were as much in the dark on this at the season's end as at he beginning. Although activity declined in the latter part of the breeding cycle, wo of our best nights for observations were in early August. Another time, one bird vas silent during a steady all-night drizzle, while a second bird was calling at 10:00, 1:00 and 11:30 p.m. Generally however, there was less activity during poor veather.

A male near our home followed one of three routines on going aloft: an initial peenting" cruise over his range followed by only sporadic flights, or the initial ruise followed by an extended period of calling, or the initial cruise, varying in uration, and then cessation of display activity for the evening. The time of the nitial cruise was random, coming anywhere between sunset and an hour and a half efore. In addition to differences due to concentration (the crowd excitation factor reviously mentioned) there seemed to be considerable individuality with respect to ıe amount of calling.

One home range, established on June 4, was finally deserted 72 days later on ugust 16. For 10 weeks the male Nighthawk was attached to this site. Of 15 ranges, wo appeared to have been prematurely abandoned — display ceased in one by July 2, in the second by July 20. For the remaining 13, the first release was on August 6, the last on August 25. These dates may have been later than usual, as spells of ool, showery weather between late June and mid-July could have affected developıent of young.

Migratory or pre-migratory movements appeared to commence while ranges were till being held. Five Nighthawks were observed in southerly flight on July 23, in the ity but not within a home range. As more than two eggs per nest are rarely reported r the Common Nighthawk, this group likely consisted of members of more than ne family or of non-breeders.[4] On August 14 four birds silently drifted southeastvard, coursing low through two adjoining ranges. The home males were aloft yet either challenged the group or otherwise appeared to react in any way. This was exeptional because, if his mate or young were on the wing or if a neighboring

Table 1. Nighthawk Home Ranges by District in Saskatoon, 1971.

	Sutherland	*Field A*	*North Industrial Area*	*Downtown*	*East Side*	*West Side*
umber of Iome Ranges	1	5	5	16±	11	10+
otal Area)f District (acres)	900	390	1,300	740	9,820	7,310
)eveloped area					7,510	6,120

Nighthawk transgressed into his range, we have come to expect some reaction fron the male.

Birds were occasionally heard calling aloft at dawn, in mid-morning, mid afternoon and early evening. Most calling, however, was done from about half a hour before sunset to an hour after.

We concluded that the "peenting" flight, usually about 50 to 125 feet above th ground, was mainly display and territorial activity and only incidentally fo feeding.[2] Rarely would a male leave the normal pattern and tower much higher int the sky, still giving the "peent" call, the highest observed being about 800 feet abov the ground. Or, again as an exception, though much more frequently, he woul swoop down, still calling, then swing back up to his position. Sometimes the femal was aloft with the male, though usually only for a short span.

We could walk into Field A and have all the males within hearing and sight at on time (for as long as we chose to put up with the mosquitoes). Hence, the determination of numbers was more accurate than elsewhere. Field A appeared to approximate natural habitat for Nighthawk in this region. In any event, being essentially in its original state, it served as a comparison with the artificial habitats.

The Nighthawk density Downtown was greater than in Field A, one male per 4 acres as against one per 83 acres. The average home range size Downtown was les than that in Field A, 26 acres compared to 70 acres. (Not all of Field A was covere by home ranges and not all of the territories were completely within Field A. Roughly, for Downtown, the Nighthawks average range was four blocks in size – however, ranges were anything but uniformly shaped and usually did not line u with streets. Because tracking a range boundary is inexact, even under the ideal observation conditions in Field A, these sizes are approximations.

On the East and West Sides, home ranges were mainly along principal arteries an at primary intersections where flat roofs were concentrated; much of the area i these suburbs was unoccupied. No birds were detected in several places where ther seemed to be a sufficiency of flat roofs. Most of these apparently suitable but unoccupied sites were in the newer subdivisions. Further, on the East Side, at least tw home ranges of previous years were not occupied in 1971. The number on the We Side is thought to be low, as we later concluded that two of the surveys were nc made on good Nighthawk evenings, and fewer opportunities arose for making random observations there.

Our data showed that where a range abuts two or more other ranges, minimu size was 10.2 acres, average was 25.7 and largest 56.3. Generally the largest wer those with fewest neighbors and the smallest were ones completely surrounded. Th final estimate of the number of ranges downtown was made by comparing Arn

Table 2.—Home range size on the East Side of Saskatoon, 1971

Range Location	*Approximate Size of Range (Acres)*	*Number of Adjoining Ranges*	*Remarks*
University Campus	74	0	Isolated, no neighbors
Main St. & Copland Ave.	51	1	Bounded by 2 ranges for first half of the season, 1 for the last half.
Ewart Ave. & 8th St.	39	2	Bounded by 2 ranges on 2 "sides", open on the other 2 sides.
Five Corners	41	3	Bounded by 3 ranges on half the periphery, open on the remainder

rong's results for Detroit to our data. Armstrong's study area was a 90-block istrict of 870 acres, slightly larger than our downtown area, but with similar uilding heights. Four Saskatoon ranges on the East Side were fully traced and comared for general compatibility with his results; and we already had a rough picture, gether with some fixes.The result was an increase from 15 to 16 in our estimate of e number of ranges in downtown Saskatoon.

The four fully traced home ranges, two of which had a common boundary half a lock from our house, were the most extensively observed of all. Though areas were till approximate, they showed the tendency toward smaller size as the number of eighbors increased.

The key decision in our survey was that the "peent" is given only by the male ighthawk. In the early days one observer wrote that both sexes gave this call; since en a number of people have disagrred.[11] Knowing this, and conscious of the difculty of distinguishing between the sexes at dusk, we paid special attention when wo birds were aloft together. If both "peented", did they display in any way other an the challenge-defense activity of two males at their mutual boundary? If only ne called, was there activity other than what one expects of a territorial pair? Two irds in an isolated, relatively open range were watched for half an hour one vening when both were active but roving separately and at different altitudes most f the time — only one seemed to call.

In retrospect, the surveys should have started ten days earlier to allow for poor eather, unproductive evenings and other plans. Once numbers and distribution owntown were tentatively known, a triangulation check should have been made om three or four selected rooftops.

ome Incidental Observations

The first known abandonment of a range occurred on or before July 12. Later we oticed that two adjoining males extended their ranges into part of this vacated area. fter August 18 the situation became more confusing in several places, possibly due changes from breeding to pre-migratory behaviour. Consequently, observations ward the end of the season, though valid for other factors, were not used for deterining range size.

Armstrong noted that where a range abutted unoccupied territory, the bird still nly took up a certain amount of space, although it would make occasional forays to the vacant area, a circumstance also observed in Saskatoon.[11]

The male also flew patterns only 10 to 20 feet up and sometimes even lower. hile this close to the ground the bird rarely called and was not seen making short lides or alternating side-slips or rapid flutters, all manoeuvres observed when it as higher. Though flying swiftly in an erratic manner when low, it appeared to be imply coursing. Females behaved the same way. They dropped directly from the oof site, literally slipping over the edge of the roof and flying a long circular path ver part of the range one or more times, then swinging back onto the roof. Because f the different behaviour of the male at low level, and because the female appeared spend most of her time there when on the wing, we took these flights to be feeding rays.

The daytime torpor of the Common Nighthawk, its floppy flight, its nontreamlined facial structure and its soft feathers are not such as to remind one of a ighly developed flyer. Yet seeing the bird coursing among obstacles quickly ispells any doubt. Once, in an industrial property at twilight, my wife and I wathed a bird hunt at speed 3 to 10 feet above the ground amid a litter of poles, wires, iles, sheds and junk. Flight control was superb.

To those wishing to track nighthawks in an urban area, we offer some suggestions. repare in advance the answer you will give the policeman who stops and asks what ou are doing — saying you are looking for Nighthawks is, we found, somehow inadequate. If you park beside a house while listening for birds, you may notice the corner of the curtain being eased back, especially after dark. At such times, you should appear busy. Should you desire to get up onto the roof of a building to look for a nest site, don't bother the janitor — you have to go to the top.

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Common Nighthawk R. E. Gehle

ROJECT NEST-BOX —

Edmonton, 1972.

by ROD BURNS*, DON STAPLEY, RICHARD SVRCEK**
AND KEN TRANN***

In the spring of 1972, the nest-box project here in Edmonton was fortunate ough to receive financial assistance from the Opportunities for Youth Program. r this we owe thanks to the Federal Government and Susan Tanner, a project- ficer in Edmonton, who was a major supporter. We also received letters of recom- ndation from the following people: Cameron Finlay, Richard Fyfe, Bob Gehlert, ichael Hampson, Edgar T. Jones, Al Karvonen, Gordon Kerr, Robert Lister, vid Neave and Andy Stork. To them we also owe thanks.

Given so much support and such freedom, we were able to accomplish most of our jectives, and try a few experiments. We planned to build 200 more Bluebird nest- xes and 200 Sparrow Hawk boxes. We would keep notes, maintain the trail of xes, and band the young.

The smaller houses, for Mountain Bluebirds, were easily built, and putting them the trail was no problem. We always carried a few houses with us and put them up ere necessary. The Sparrow Hawk boxes were a problem. We had difficulty fin- ng wood and we had difficulty building the houses without taking a large amount time. Compared to bluebird houses, we also had to spend four or five times the ount of time per Sparrow Hawk box just finding a suitable location. Then we had put them up which, in some cases, involved the use of climbing spurs. But even so, did manage to get out about 80 boxes. Unfortunately, we were too late for the 72 season, but we are looking forward to results in the spring of 1973.

During the course of the project, questions and ideas arose, which we tried to ex- re. For example, "Would boxes placed in small 'habitat groups' provide more ailable nesting sites than the standard one box every 1/2 mile?" We were asking is question because there were many pairs of Bluebirds that appeared dissatisfied th the "one box" or were chased out by competition (Tree Swallows, House arrows or House Wrens). We wondered if one or two extra boxes placed nearby uld lessen the competition or prove to be a more suitable site for fussy Bluebirds. worked in several areas. In a nest-box numbered 23-66 a pair of Bluebirds built a st early in the season (May 9). They appeared established but several days later we w three pairs of Tree Swallows harassing the Bluebirds. So we placed three more xes nearby; one was on a post about 30 feet from the first box on the same side of road and the other two were placed on the opposite side of the road, also about feet apart. The reaction to this was immediate. The Tree Swallows were over ecking the new boxes before we were back in the car. When we returned several ys later, the Bluebirds had moved to the new house on the same side of the road d two pairs of Tree Swallows were nesting in the boxes on the other side of the ad. The original box still contained a Bluebird nest, but was abandoned in favor the new box. This little trick also worked on House Sparrows and House Wrens und harassing Tree Swallows and Bluebirds.

The significance of this is that a Bluebird trail need only be 20 miles long to have effect. An area could be saturated and then a few "feeler" houses set out beyond is limit to encourage the occupancy by new pairs. This new area could then be ammed and so on. But it must be kept in mind that this is only a theory, with a few ccessful cases. There is a possibility that as well as Bluebirds, the increase of

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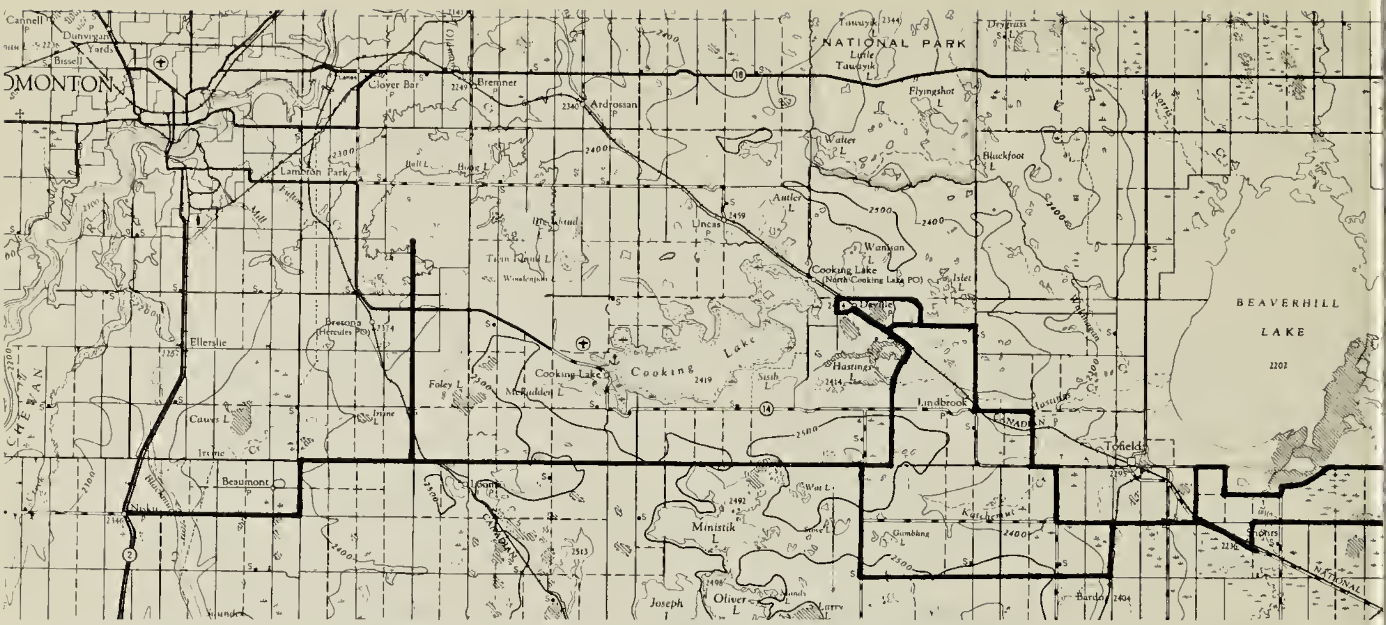
1724 - 48th Ave., Edmonton, Alberta.
11425 - 78th Ave., Edmonton, Alberta.
*Box 402, Holden, Alberta.



House Sparrows and House Wrens would also be encouraged. To prevent this were poking tiny holes in the eggs of House Sparrows and leaving them. This prov to be a better idea than cleaning out the house and have the Sparrows renest. were also putting up another house on the other side of the road from the Sparrow The Wren problem is not so easy. We have not solved it, but putting up more hous in an area does take the pressure off. The Wrens will keep to themselves if the new erected houses are placed far enough away, but this could also encourage anoth pair of Wrens to nest. So Wrens remain a problem that is not easy to solve.

We tried another interesting idea that we got in other years when we noticed th some Bluebirds did not renest. We also noticed that the original nest-box was ofte occupied by Tree Swallows or Wrens in the few days before a renest would hav been started. So we tried the "new house experiment". We would place a new hous

Table 1. – Bluebird and Swallow data from Edmonton nest-boxes. 1972.

	Production				*Banding*		
	Eggs Laid	*Eggs Hatched*	*Young Fledged*	*Young Left Nest*	*Adults Male*	*Adults Female*	*Youn*
Species							
Mountain Bluebird	97	77	67	66	1	5	6
Tree Swallow	1,578	1,272	1,117	1,117	33	137	1,11

Table 2. – Edmonton Nest-box production – 1972 and 4 years combined.

	1972			*1969-1972*		
	Nests Started	*Nests Successful*	*Young Fledged*	*Nests Started*	*Nests Successful*	*Young Fledged*
Goldeneye	2	1	8	5	3	25
Bufflehead	1	0	0	1	0	0
Boreal Owl	0	0	0	1	1	5
Yel.-sh. Flicker	1	1	4	1	1	4
Say's Phoebe	0	0	0	1	0	0
Tree Swallow	282	224	1,117	434	342	1,735
House Wren	33	29	186	66	55	323
Mountain Bluebird	26	17	67	46	28	126
Starling	2	2	6	–	–	–
House Sparrow	17	0	0	–	–	–
Common Grackle	0	0	0	1	1	2
Total	364	274	1,388	556	431	2,220

Total Houses: 514 in 1972. 900-1,000 for 4 years.

ar a pair of Bluebirds whose young were ready to leave. On four occasions the uebirds renested in the new house. On two occasions they used the original house. is is all we tried.

By keeping notes on each Bluebird house and by banding adult nesting birds, an teresting piece of information was collected on Tree Swallows. On three occasions found more than one female Tree Swallow incubating a clutch of eggs or feeding ung. At any one time there was only one female in the house but we caught other males either sitting on the eggs or feeding the young.

Hatched Egg-Shells Covering
COMMON TERN EGGS

by DAVID R. M. HATCH*

While conducting a study on Little eorge Island (52°51' — 97°47'), Lake innipeg, between July 1 and July 10, 71, I made an unusual observation in mmon Terns regarding hatched egg- ells.

In each of seven nests, one egg in the utch of two or three was covered by e large end of an egg-shell from a hat- ed egg. In each case, the additonal ell was firmly stuck over the large end the unhatched egg. I removed the ex- a egg-shell from six eggs. In two of ese six cases, the big end of the unhat- ed egg was already pipped. Chicks tched within 24 hours from four of ese six eggs. The two remaining eggs ch contained fully developed dead ung. All four young from the eggs hich hatched were accepted by their rents. In the seventh egg from which I d not remove the additional shell, the ick failed to hatch.

N. Tinbergen refers to the large end the hatched egg as the "small 'lid' at e obtuse end which comes off during tching."[3] In dealing with the Black- aded Gull, Tinbergen suggested that e of the reasons for egg-shell removal the possibility that this "lid" might end to slip over an unhatched egg, us trapping the chick in a double ell." This may have occurred in the se of the Little George observations.

Adults that I observed generally carried the hatched portions of eggs from their territory and usually out of the colony. This behaviour differs somewhat from that described by R. S. Palmer who wrote that "adults may fly up with a shell, then drop it while they are still over their own nesting territory."[2] He did not mention egg-shells slipping over the ends of unhatched eggs.

There is the possibility that these "lids" were actually placed over the unhatched eggs. In the Honey Buzzard, the two halves of a hatched egg-shell are placed one inside the other before they are removed from the nest.[1] My observations may represent a similar tendency in Common Terns, or they may merely show a failure of some adults to remove egg-shells following hatching with the resultant accidental slippage of the "lids" over unhatched eggs.

I would like to thank Dr. Roger M. Evans, Dr. Kees Vermeer, and Dr. Robert W. Nero for their assistance in reviewing the manuscript. My work was undertaken while employed by the Canadian Wildlife Service.

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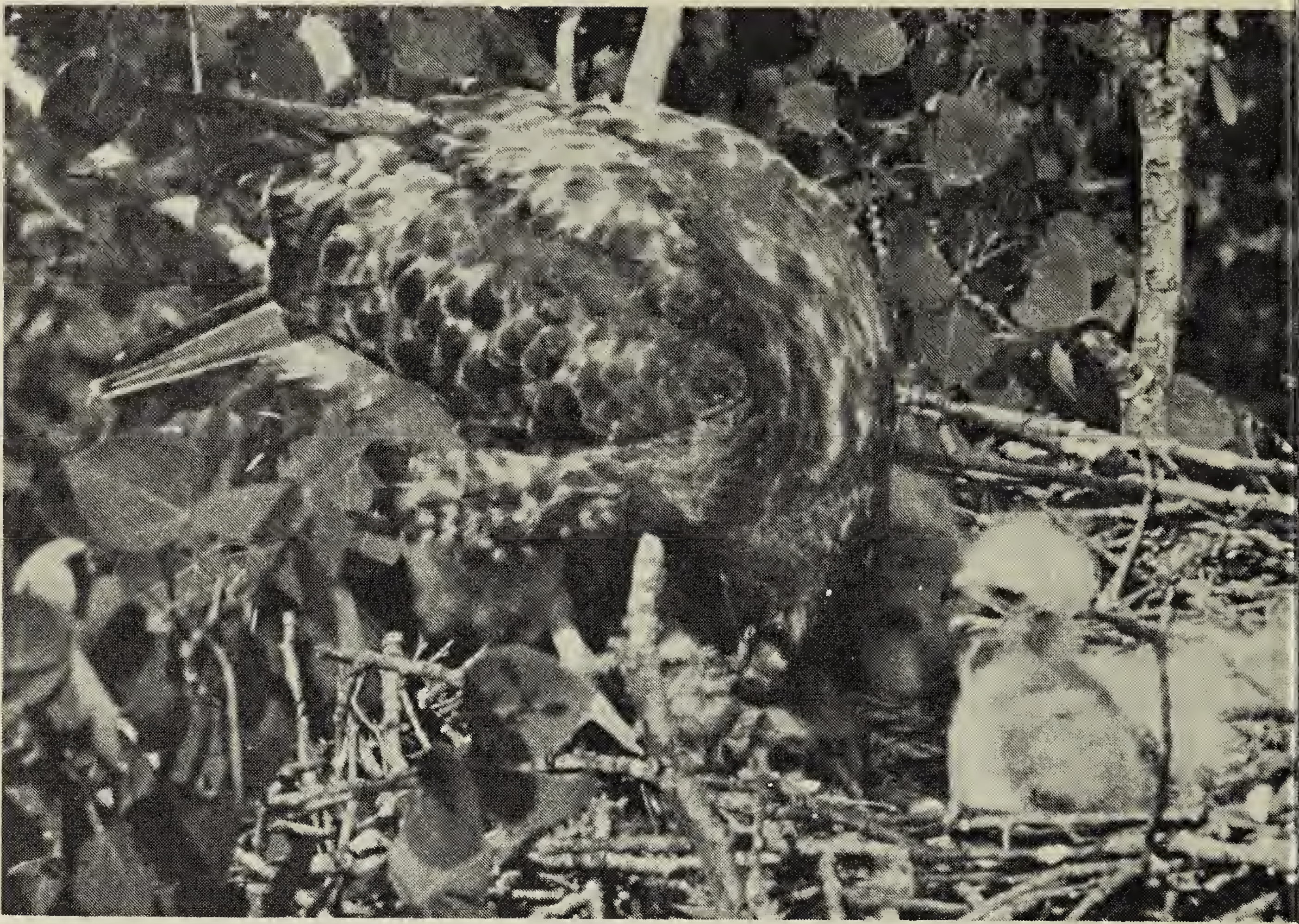
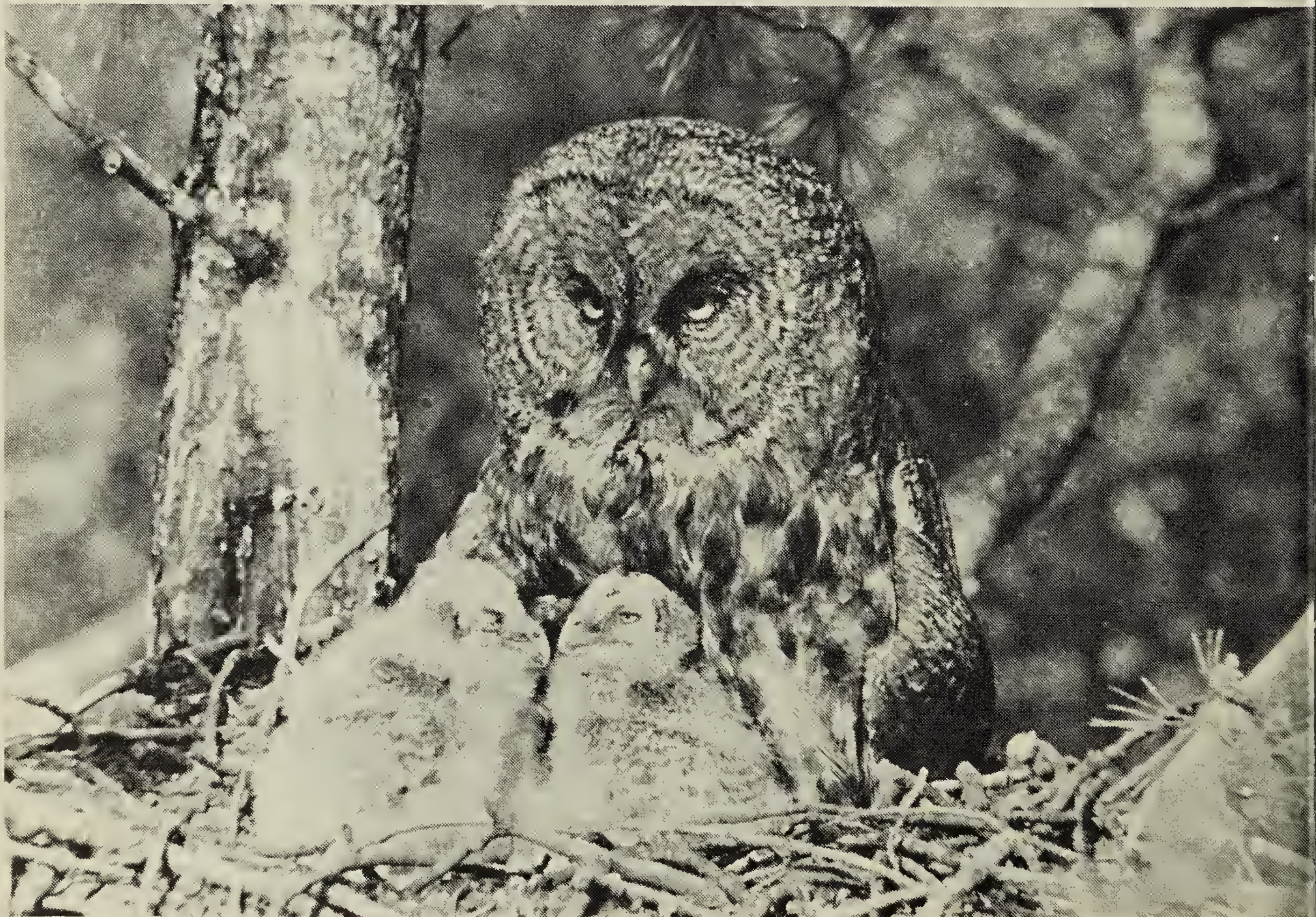


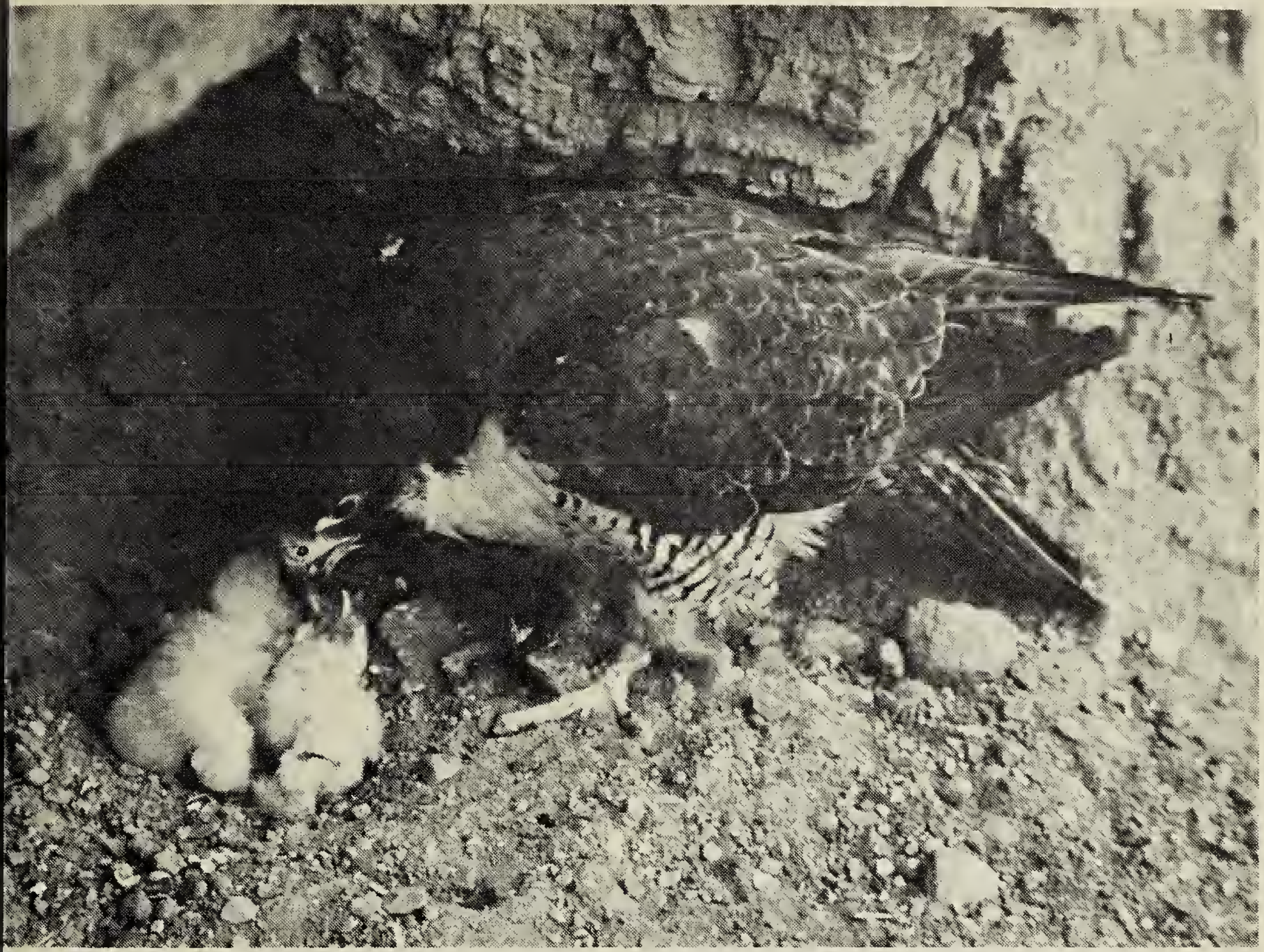
Red-tailed Hawk with young

C. S. Rees

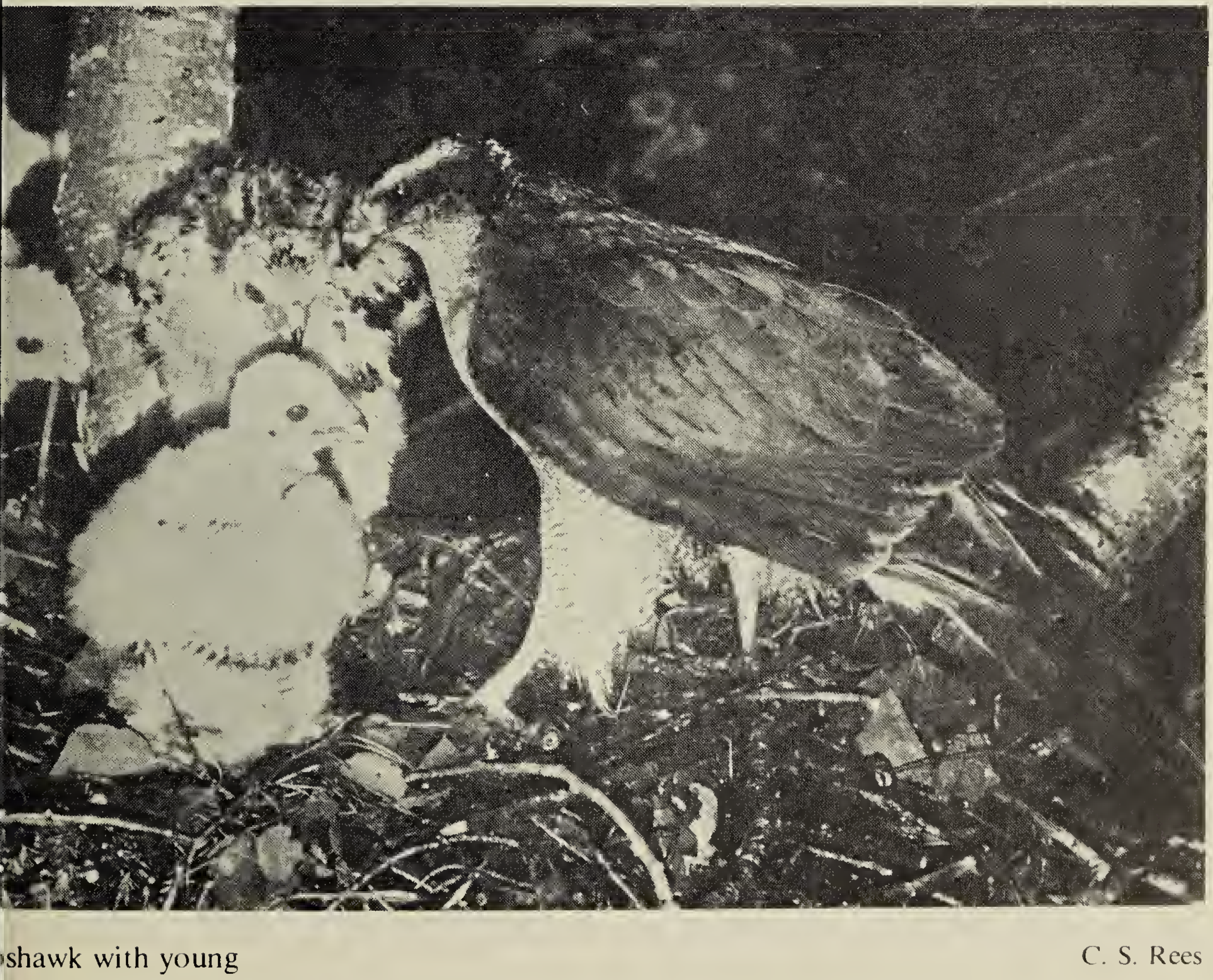


Great Gray Owl with young

R. E. Gehlert



regrine Falcon with young R. W. Fyfe



shawk with young C. S. Rees

Observations on a GLAUCOUS GULL at Calgary, Alberta

by D. VAUGHN WESELOH* and
R. A. OWENS**

California and Ring-billed gulls nest at several locations near Calgary, Alberta. After their arrival in the early spring but before nesting activities are fully established, these gulls, as well as other migrant gulls, roost communally on several different sloughs within and near the city limits of southeast Calgary. In the early spring they roost primarily on large ice-bound sloughs. Later, as break-up progresses, they move to a single, large, alkaline slough shallow enough to stand in. It was during observations of these two gull species at their early spring roosts that the senior author first, and then repeatedly, observed a Glaucous Gull.

The gull, an almost totally white second year bird was first observed on March 28, 1972, at 6:30 p.m. It was discovered at about 500 yards distance with a 20 - 40 X binocular telescope sitting with a small group of adult California and Ring-billed gulls. At this time it was studied for approximately 15 minutes: the plumage was reminiscent of a Snowy Owl, the wings, back and head being white with slight brown mottling. It was much larger than either the California or Ring-billed gulls and, when sitting, was at least as large as several adult Herring Gulls which were also present.

At his point the junior author was notified. However, due to the great number of gulls present at the roost by this time (3,600 - 4,000 birds) and the gull's flighty nature as dusk rapidly approached, the Glaucous Gull could not be found again.

Two days later, March 30, a second year Glaucous Gull (presumably t same individual, as are all subsequ sightings) was again located duri routine observations at the roost (1 m west and 2 miles south of Shepa Alberta). A more complete descripti which included the following poin was taken: 1. no black or gray on win wing tips or mantle; 2. bill, which w black-tipped, and legs appeared flesh pinkish in colour; 3. tail all white; faint mottling on wings, back and he 5. larger than adult Herring Gull wh both were standing. These points are general agreement with J. Dwigh description of a second year Glauc Gull.[1]

On this occasion the gull was again a distance of 500 - 600 yards but wit the next hour flew to about 300 ya where all the above points of t description were confirmed. It remain at this location until observations w discontinued at 7:30 p.m. At h sighting, like the one two da previously, the gull was sitting on the with a small group of adult Californ Ring-billed and Herring gulls but a co siderable distance removed from t main mass of roosting gulls.

The Glaucous Gull remained in t Calgary area until at least April 12 a was seen on 10 different occasions by fewer than 14 different people duri that period. These sightings are su marized in Table 1.

Because this Glaucous Gull w carefully observed over a relatively e tended period of time (16 days a more than 8 3/4 observation hours) so many experienced observers, so general comments about its behavi might be in order. One was impress with its great periods of inactivity. On least one evening, the gull remained s

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ng, head tucked under the wing, during e entire time it was observed (about 1 /2 hours). At other times great pains ad to be taken by various observers to rouse the gull so that its diagnostic atures could be seen. Also, during all eriods of observation at the roost, the ull showed absolutely no individual in- raction with any of the other gull ecies; however, it appeared to take art in the all communal activities ssociated with the roosting gulls, i.e., it articipated equally in upflight displays, re-roosting assemblages and activities nd it appeared at the same roost for ore than 2 weeks.

Much to the surprise of the observers, e Glaucous Gull was found during id-morning on the Bow River at a oint approximately 6 miles south of the hepard roost on April 5. It was also een at this location during mid- orning on April 7 and 8. At these mes it appeared to be scavenging for od on the ice flows and along the hore as it flew up and down the river. he fact that it was feeding along the iver (a natural food source) becomes ore interesting when it is realized that uring that period when this gull was in e Calgary area, nearly 40 hours of ull-oriented observations were made at e three Calgary Sanitary Land Fill ites (garbage dumps) and never once was this large gull observed. Contrary to this, in at least two other cases where Glaucous Gulls have been observed in southern Canada (Vancouver, B.C., 1971, R. Drent, pers. comm.; and Nelson B.C., 1972, W. Merilees, pers. comm. and personal observation) they are known to frequent dumps regularly. The significance, if any, of these contradictory observations is not known.

The normal wintering range of the Glaucous Gull extends south from the Arctic coast and islands along both Atlantic and Pacific coasts of Canada. It is scarce and irregular in most of the southern interior even in migration, though it appears regularly in small numbers on the upper St. Lawrence River and on the Great Lakes.[2]

The weather during the period March 28 to April 12 was quite variable and included periods of extremes, i.e., unseasonably cold and snowy as well as warm and sunny. Two days prior to the first sighting of the Glaucous Gull, there was an extensive cold front with much northerly and northwesterly wind that brought 2-3 inches of snow to the Calgary area. It is not untenable that the gull was blown inland by this storm.

From records available to us, this appears to be the sixth record of a Glaucous Gull in Alberta (photographs

TABLE 1.
Sightings of a Glaucous Gull near Calgary, Alberta
March 28 through April 12, 1972

ate	*Location*	*Time*	*Observer(s)**
arch 28	Shepard Roost	6:30 - 6:45 p.m.	DVW
arch 30	Shepard Roost	6:30 - 7:30 p.m.	DVW
pril 2	Shepard Roost	7:15 - 7:30 p.m.	WH, WGM, RP, MP, DVW
pril 3	Shepard Roost	6:10 - 7:30 p.m.	BL, VL, MO, RAO, CWE, WS, DVW
pril 4	Shepard Roost	6:10 - 7:30p.m.	CW, DVW
pril 5**	Bow River	9:45 - 10:15 a.m.	RP, VL, DVW
pril 7**	Bow River	8:50 - 9:35 a.m.	VL
pril 8	Bow River	12:15 - 12:30 p.m.	GA, WB
pril 10	Shepard Roost	6:10 - 7:35 p.m.	DVW
pril 12	Shepard Roost	6:10 - 7:10 p.m.	DVW

*DVW — D.V. Weseloh, WH — Willis Hall, WGM — W. Garry McKay, RP — Richard Palindat, MP — Michael Palindat, BL — Bill Lang, VL — Virginia Lang, MO — Majorie wens, CWE — Cleve Wershler, WS — Wayne Smith, CW — Cliff Wallis, GA — Gerry Ansell, WB — Wendy Beirness.

**photographed.

of this specimen have been accepted by and are on file with Prof. W. Ray Salt, Edmonton). The first specimen, an adult, was collected at Lacombe in 1915. A second specimen was caught in a coyote trap at Youngstown in 1940. Both of these specimens are held by the Alberta Provincial Museum.[3] During the winters of 1960 and 1961, a Glaucous Gull was reported from Lake Saskatoon, where it apparently sat on the ice and fed on dead ducks (W. R. Salt, *in litt.*). From the files of the Calgary Field Naturalists' Society there is a record of a Glaucous Gull observed at Beaverhill Lake (40 miles ESE of Edmonton) by seven observers in May, 1966.

It is hoped that this account will encourage closer observation of all gu congregations so that the frequency an circumstances of future visits by rar species might be better documented.

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SUGAR WATER FOR
HUMMINGBIRDS
AT LANIGAN, SASKATCHEWAN

by MRS. WALTER GUNTHER*

My husband and I have derived much pleasure from a mutual hobby. For years we have observed the habits of Ruby-throated Hummingbirds.

In 1965 we first saw two at one time. We suspected that they had a nest in our trees as we saw them frequently that summer. In 1968, I began keeping records of each sighting. Their visits to our flower garden are as frequent as 5 to 15 minutes. They are extremely busy from 6 to 7 a.m., around noon to 1 p.m., and again from 6 to 7 or 8 p.m.

The earliest we have seen them is June 2 and the latest is September 27. We are sure that my husband discovered their nest, high up in a poplar tree. One year, on the first occasion that I saw the young ones, they and their mother were flying right near the tree where we think the nest is. They put on a spectacular aerial display. At times I could hear their faint chipping sounds. They became quite unafraid of us. The dat on which we see the immature ones i usually August 12 or 13.

In 1970, I was thrilled when I succeeded in obtaining several coloure snapshots of them. I set up my old box type camera on the kitchen window sill which faces east. If a "hummer" came t a certain lily or the feeder, I would sna the shutter and, hopefully, have a picture. One day the female sat on the fenc for 20 minutes or more, scratching he head, spreading out her white-tippe fan-shaped tail. Truly a wondrous sight

If you wish to attract hummingbirds plant deep-throated flowers. Nicotina i splendid, also columbines, delphiniums morning glories, lilies with curled bac petals and many others attract them. I 1970, '71, and '72, we had feeders containing red sugar water. They quarre over it. Please be advised that a feede must be washed at regular intervals Once they become used to it, the depend on it.

Observing hummingbirds is fascinating and rewarding hobby. W have had countless hours of enjoymen and relaxation from it.

*Box 114, Lanigan, Saskatchewan

BERTA

REAT CRESTED FLYCATCHER

HTINGS, 1972

GRAEME M. GREENLEE*

s recorded in the June 1972 *Blue* Great Crested Flycatchers were first n by my wife and me near Two Hills, erta, in the summer of 1971.[1] Since species, which is hypothetical for erta, has only been sighted on two vious occasions, we wish to report its urrence again in the summer of 2.

ingle birds were seen on two suc- ive mornings of May 24, 25 and 26. se three sightings were all in dif- nt locations. Although the birds e seen in the same general vicinity of Two Hills as in 1971, all three tions were different from those of 1. Later sightings were in the same ral location as those in 1971: single s on June 28 and July 18, and three ne time on July 19.

lthough we are now convinced that e birds are resident here in summer, have been unable to find any in- tions of nesting.

EENLEE, G. M. 1972. *Great Crested Flycat- er again observed in Alberta.* Blue Jay 30: 86-

5-114 A. St.,
onton, Alberta.

EMPTED NEST BUILDING AEROPLANES BY EE SWALLOWS

E. O. HOHN*

would like to relate an occurrence ch was reported to me by the ageress of Gateway Aviation on e Martin, Uranium City, in late e, 1971. She reported, as if it were a l-known phenomenon, that a little ier that season swallows often en- d the nacelles of moored float planes ugh a circular aperture, carrying in ll sticks as nest material which they osited somewhere within, generally ome part of the engine. If undetec- such nests, partial or completed, would probably ignite when the engine started and heated up. I concluded that the pilots had always noticed what was going on and removed the material brought in by the birds, since the observer did not mention that fires due to this cause had actually occurred.

I noticed a circular hole on the nacelle of a "Beaver" aircraft which, it seemed to me, might well look to a tree swallow like the hole in a nest box. Though my informant did not identify the species of swallows involved, there can be little doubt that they were Tree Swallows. The only other swallows I saw about Uranium City were Barn Swallows, though Bank Swallows have been recorded in the area. The nesting habits of these latter two species do not fit the description that I was given of the nest material.

I can find not reference to this sort of behaviour in the recent Canadian Wildlife Service Report (No. 4) Studies of Bird Hazards to Aircraft, 1971.

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University of Alberta,
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PIED-BILLED GREBE

NESTING OBSERVATIONS

by MAMIE McCOWAN*

Some 5 miles from Brandon, Manitoba, where a seldom-used road allowance runs between two ponds, I made the following casual observations of two easily seen Pied-billed Grebe nests.

On the morning of June 25 1972, near some cattails in the pond to the north of the road two Pied-billed Grebes were carrying muddy vegetation and setting it in place to form a nest. One of the grebes got on the structure and appeared to be trying it out for size. Rather foolishly I got out of the car to get nearer to take a picture and the grebes disappeared; I did not again see grebes at this location.

On the afternoon of the same day in the pond to the south of the road a Pied-billed Grebe was sitting on a solid hummock of earth sticking above the water and at least 25 feet from the nearest protective cover. On visits made July 1, 3 and 4, the grebe was sitting on the hummock; on the latter day it slipped off into the water followed by three tiny young ones. On July 6 I observed an adult grebe with a young one on its back, which it left at the nest site with the other adult and young; it then swam off and came back with food. It swam quite fast to and from the feeding area; then hesitated before offering the food. On one trip it swam around the hummock before giving up the food. This was the last time that I saw the two adult grebes together. On July 20 one adult and five young grebes were seen together making cheeping sounds.

* 1415 - 8th St., Brandon, Manitoba.

PELICANS
RETURN TO LAST MOUNTAIN LAKE

by JOHN P. HATFIELD*

Throughout the summer of 1972 several hundred White Pelicans remained at the north end of Last Mountain Lake. With this many pelicans around I was sure they were nesting on one of the many islands found at the north end of the lake. Finally on June 30 while checking the islands for other nesting birds, I found 18 young pelicans on one of the smaller islands. Gary Anweiler reported that pelicans bred in this part of the lake until 1954.[1] These birds constitute the first young I have seen since I moved to the area in 1968.

Nesting pelicans are vulnerable to human disturbance, so I recommend that anyone visiting pelican colonies treat them with respect — better still, stay away from them. Young pelicans hatch naked and remain so for about 2 weeks before a light down appears; as a result, any prolonged exposure to sun, to cool, rainy weather or to gulls can result in their deaths. They are dependent on adult pelicans for protection and feeding in their early life. Thi period generally occurs around th middle of May to the end of June in cen tral Saskatchewan, depending on thei hatching dates. Hopefully, this nestin colony of pelicans will increase at th north end of Last Mountain Lake in th future.

[1] ANWEILER, G. G. 1970. *The Birds of the La Mountain Lake Wildlife Area, Saskatchewa* Blue Jay 28: 74-83.

*Canadian Wildlife Service, Box 280, Simpso Saskatchewan.

GREAT GRAY OWLS
RAISE TWO YOUNG SOUTHEAST OF EDMONTON, ALBERTA

by NORBERT G. KONDLA*

Few nests of the Great Gray Owl ha been found in the Prairie Province Only three nestings have been reporte for Manitoba, two of which were in t same nest.[7] The only published repo for Saskatchewan is a 1949 nest.[6] T following is a hitherto unreporte nesting at Carlton. On June 19, 190 George McCraig shot the female owl the nest and collected the two eggs th proved to be advanced in incubatio The nest was 30 feet up in a "fir" tr and composed of twigs, sticks a clumps of moss. It was lined with de leaves and contained feathers of sm birds and part of a squirrel. The eg from this nest are in the collections the Western Foundation of Vertebra Zoology, Los Angeles, California, fro whence this data was obtained.

By far the greatest number of nestin are reported from Alberta where t Great Gray Owl is a scarce inhabitant northern and western Alberta. It known to breed at Rocky Mounta House, Edson, Jasper, Belveder Whitemud Lake and Fort Chipewyan W. R. Salt (pers. comm.) also repo active nests at Athabasca and Flatbu The Western Foundation of Vertebr Zoology has a clutch taken by A. Twomey on May 7, 1930, near Fawce 50 feet up in a poplar (a nest referred by A. C. Bent, though without an ex

cality[1]), and a clutch collected by P.
. Pope on April 9, 1915, from a
reviously unreported nesting near
unvegan in an old Goshawk nest, 55
et up in a "pine." There are two recent
sts in "central Alberta."[5]

On May 4, 1972, I found an active
st at Miquelon Lake Provincial Park,
out 30 miles southeast of Edmonton.
his is approximately 100 miles south
d east of the breeding range as shown
The Birds of Alberta.[10] The park is in
e Buffalo Lake moraine and has
aracteristic knob and kettle
pography.[2] The nest site was revisited
n May 5 with A. Langevin, P.
idgway, G. Robbins, G. Rushton, W.
mith, C. Wallis, B. Watt, and C.
ershler.

Vegetation near the nest site was
ixed deciduous forest with occasional
nall stands of White Spruce. Low wet
eas contained typical aquatic flora.
he nest tree was in a relatively open
and of woods composed of Balsam
oplar, Quaking Aspen, Saskatoon or
lderleaf Juneberry, Red-osier
ogwood and *Prunus* spp. The nest was
0-60 feet up in a Balsam Poplar
owing near the bottom of a 40-foot
eep, circular depression (kettle). The
vel bottom of the kettle was covered by
dges and grasses.

W. Smith climbed to the nest and
ported that the nest contained three
gs which, judging from their soiled
d glossy appearance, were advanced
incubation. The nest was 2 1/2 feet
gh and 2 1/2 feet wide. Although the
neral appearance was that of a Red-
iled Hawk nest, the presence of a
crepit mud cup indicated that it was
ssibly an old Black-billed Magpie
st. The eggs lay on dead poplar leaves,
small down feather and fine strips of
plar bark.

Both adult birds were constantly
esent and seemed quite unafraid of the
b of observers. They frequently lan-
d on branches within 10 feet of W.
ith at the nest and G. Rushton in a
arby tree. R. W. Nero and the few
ers that have studied Great Gray
vls at nests have alluded to the excep-
nally quiet and tame behaviour of the
birds.[8, 9] Despite the large number of observers on May 5 and many subsequent visits by other observers, the owls managed to raise two young (G. Rushton, pers. comm.).

Both the situation of the nest and nesting habitat agree favorably with previous observations. Nine nests found by A. D. Henderson at Belvedere, NW of Edmonton, were 30 to 50 feet up in aspen and Balsam Poplars in deciduous woodland.[3, 4] The collections at the Western Foundation of Vertebrate Zoology contain two clutches taken by Henderson in 1925 near Belvedere, 45 feet up in aspens.

An interesting feature of the Miquelon Lake nesting is its location within a mile of one of the most heavily used public beaches in central Alberta. This startling fact and the large amount of disturbance by observers suggests the species may be relatively immune to the presence of people. Since human presence in owl habitat is an increasing phenomenon, this tolerance could be a strong point in favor of continued survival of the species.

I feel that a case can be made for this not being an extralimital nesting. The Buffalo Lake moraine provides a considerable area of suitable breeding habitat that extends southward from the known northern breeding area. The moraine is not suitable for agriculture and thus provided habitat not available in immediately surrounding areas. Further, the Great Gray Owl is an inconspicuous species despite its size. Nero made a particularly important statement in this regard: "Our birds were seldom seen more than a half mile from the nest tree and if the nest site had been only a mile back from the road, they would not have been observed."[8] Keeping this in mind, along with the dearth of competent observers in the large tracts of potential owl habitat, it is not surprising that the species may appear to be rare. In fact there seems to be little information available as a basis for statements concerning the numbers or range of the Great Gray Owl during the breeding season.

I would like to thank Lloyd Kiff of the Western Foundation of Vertebrate Zoology, W. R. Salt, and G. E. Rushton, for supplying information for this paper.

Special thanks go to R. W. Nero for supplying information and offering criticism of the manuscript.

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[2]BRETZ, J. H. 1943. *Keewatin end moraines in Alberta, Canada.* Bulletin of the Geological Society of America, 54: 31-52.

[3]HENDERSON, A. D. 1915. *Nesting of the Great Gray Owl in central Alberta.* Oologist, 32: 2-6.

[4]HENDERSON, A. D. 1923. *Further notes on th nesting of the Great Gray Owl.* Oologist, 40: 126 127.

[5]HOUSTON, C. S. 1971. *Northern Great Plain region.* American Birds, 25: 869-872.

[6]LAW, C. 1960. *The Great Gray Owl of th woodlands.* Blue Jay, 18: 14-16.

[7]NERO, R. W. 1969. *The status of the Great Gra Owl in Manitoba, with special reference to th 1968-1969 influx.* Blue Jay, 27: 191-209.

[8]NERO, R. W. 1970a. *Great Gray Owls nestin near Roseau.* Loon, 42: 88-93.

[9]NERO, R. W. 1970b. *A visit to a Great Gray Ow nest.* Ontario Naturalist, 8: 4-7.

[10]SALT, W. R., and A. L. WILK. 1966. *The bird of Alberta.* The Queens Printer, Edmonton. 51 pp.

*Box 1284, Calgary, Alberta.

Evidence of COUGARS Near Nipawin, Saskatchewan

by STANLEY D. RIOME*

"I believe you" are comforting words to a person who has had the supreme fortune of seeing a cougar and then, rather than knowing the excitement of reliving the experience again and again by telling others about it, has been forced through ridicule, to suppress his feelings and, worse still, to possibly doubt his own credulity! Over the past years it has been my good fortune to meet a number of people who, in my judgement, by the manner in which they related their stories, were completely reliable.

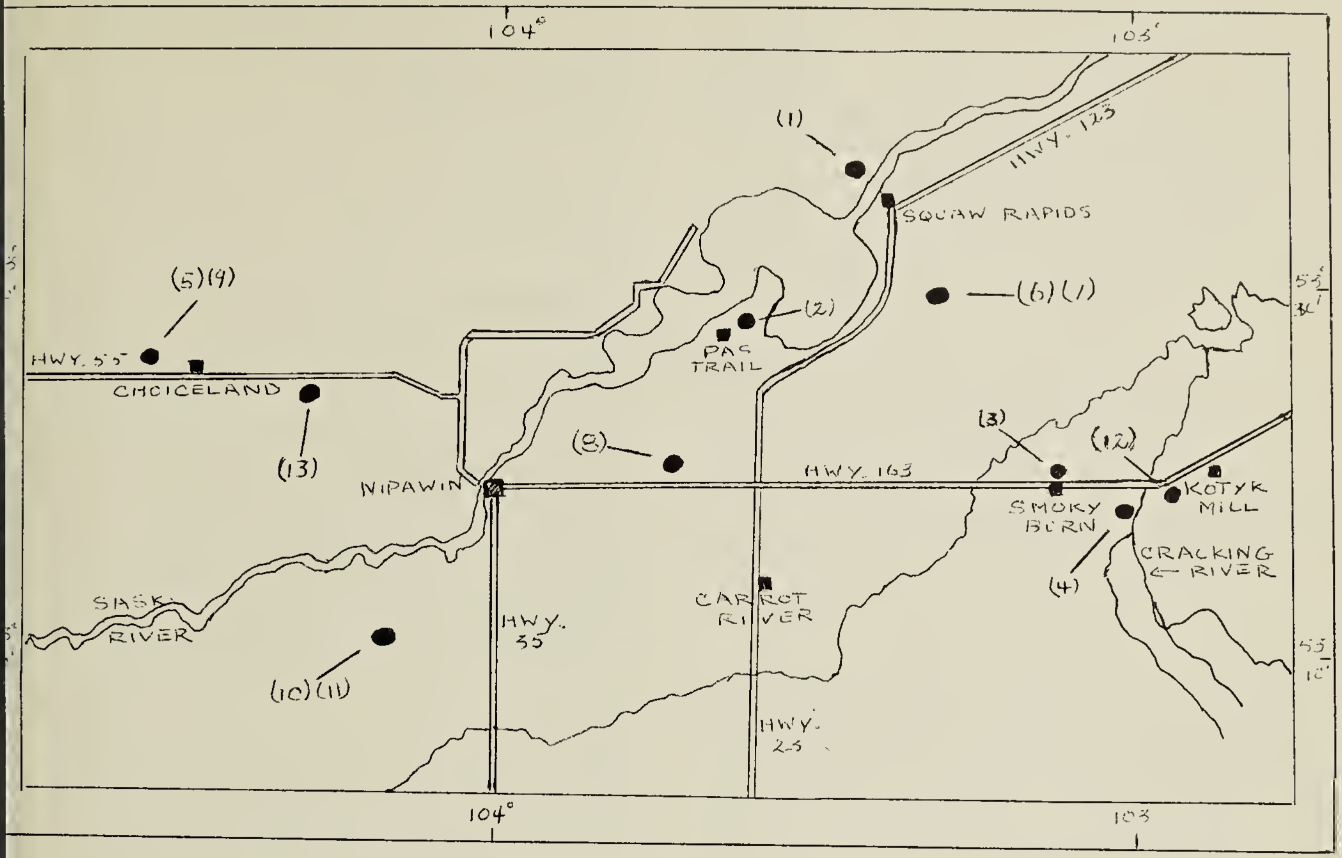
Tom White has written two well documented articles on the cougar (*Blue Jay*, 25: 84-89; 31: 42-43) which have firmly placed the cougar on the list of mammals occurring in Saskatchewan. The following accounts of 13 sightings and reports (each numbered to correspond with the distribution map Fig. 1) will serve to supplement Mr. White's previous data. The observations are generally in chronological order, from 1934 to 1973.

Mr. Ellis Hamilton has been a farmer and trapper continuously for over 4 years in the Ravendale district, 18 mil east and 18 miles northeast of Nipawin In March, 1934, he noticed his do team become extremely excited as the picked up and bounded off along a animal trail which he followed for miles northwest of the present site of th Squaw Rapids Power Dam. Mr Hamilton, a highly skilled and respecte woodsman and naturalist, knew at th time that the animal was not a wolf, a the track was round rather tha elongated, the trail was curved rath than straight and the dogs were excite rather than subdued. He was not awa that cougars were present in the area u til later years when he became awa that the animal had been a cougar. (N 1 on map)

Bill Weighill, son-in-law of Ell Hamilton, saw "an animal with a tail a long as itself, which did not move like wolf, but loped." This sighting w made near Pas Trail, 14 miles east an 10 miles north of Nipawin in 1961.(2

Mr. William Kotyk is a man who h spent his lifetime working in the bus

*Nipawin, Saskatchewan.



cations of cougar reports.

d presently owns and operates
tyk's Mill near the Fir River Depart-
nt of Natural Resources Cabin on
vy. 163, 45-1/2 miles east of
pawin. While cruising timber on the
acking River in the winter of 1968-
69, 1-1/2 miles south of Hwy. 163,
th Mr. George Lidster of White Fox
d Mr. Lorne Olenius of the Saskat-
ewan Timber Board, the three men
v tracks in the snow which they all
reed were neither wolf nor lynx but
uld have been made by no other
imal than cougar. They also located
at they called a "scratch place" but,
the object of their labour was timber
d not natural history, they did not
ke a more detailed investigation.(4)

Mrs. Stewart Kenney reported that
s. George Traub of Choiceland was
tness to a cougar killing a calf on the
nney pasture, 3 miles west and 1 mile
rth of Choiceland in 1969. The other
tle were terrified and stampeded
out in an erratic manner never before
served by the Kenney family.(5)

Mr. Ellis Hamilton had the luck to
his first cougar standing in a field
53-10-W2) near his farm in June,
70. As Mr. Hamilton drove towards
the animal plunged into the bush
m which, a quarter of a mile distant, two deer fled in panic into another open field. Some days later, Mr. Larry Ogren reported to Mr. Hamilton that he had seen a cougar in the same general area. (6, 7)

Mr. John Dahmer, who farms 14 miles east and 1-1/2 miles north of Nipawin, was summerfallowing in July, 1970, when he saw what he thought to be a deer bedded down. Mr. Dahmer stopped the tractor and walked toward the animal to investigate. He was terror struck to see a cougar stand up. It walked slowly away, occasionally looking back over its shoulder, as Mr. Dahmer walked gingerly in the opposite direction looking frequently back over his shoulder.(8)

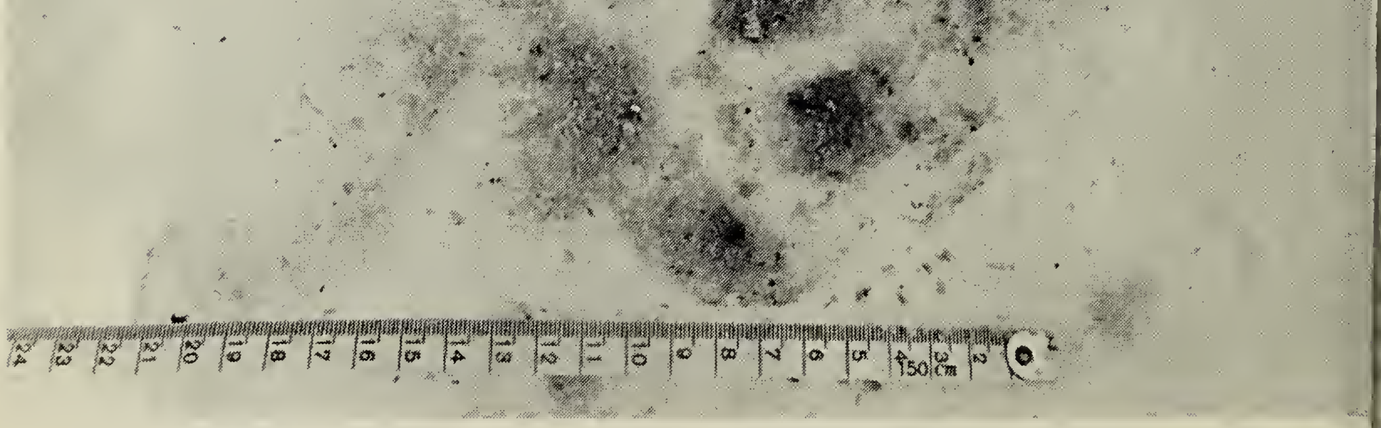
Mrs. Stewart Kenney, who lost a calf to a cougar on the family pasture in 1969, reported that for several days in July, 1972, the cattle had "spooked and ran about at break-neck speed from place to place in terror", exactly as they did in 1969. The Kenneys assumed that a cougar was the cause of the extreme anxiety and they kept the cattle in the home yard.(9)

Mr. Leslie Lokken, farmer and trapper, saw an animal in broad daylight in September, 1972, which he knew instantly to be a cougar, 2 miles north, 1/2 mile west of his farm which is located 13 miles south and 10 miles west of Nipawin (28-48-16-W2). Mr. Lokken was pleased to be able to thereby confirm a sighting made a few days earlier by his neighbour, Mr. Cecil Pierson who had seen a cougar in the headlights of his car in the same area.(10, 11)

Mrs. Don Kotyk, age 22, whose father-in-law operates Kotyk's Mill, 45-1/2 miles east of Nipawin, was driving the children home from school on December 15, 1972, when she and they saw an animal which they assumed to be their dog, walking along the edge of the road in the same direction that the car was travelling. In a flash the animal turned and leapt to the side of the road and stood facing them on a small rise. Mrs. Kotyk stated that the animal had a long body, a long tail and a small head. By its action and its shape she knew that it was a cougar. She said: "It was darker than the one I saw when I was 14 years old (1964) in my father's field in Smoky Burn. That one was golden colour.".(12, 3) Mrs. Kotyk told her sister-in-law, Miss Judy Kotyk, of the 1972 sighting. The latter contacted me and I studied and photographed the tracks on December 17, 1972. One track was closed and measured approximately 110 mm round, the toes were of nearly equal size, the back pad was large and no claw marks were visible. The other
track was splayed, but of the sam
general configuration. The animal ha
moved off along a well beaten rabbi
trail in dense willow so that strid
measurements were not possible. Sinc
Mrs. Kotyk had been thoughtful enoug
to cover the tracks with cardboard boxe
when she first saw them they were still i
excellent condition when Tom White o
Regina observed and photographe
them on December 30, 1972. (Fig. 2)

Mrs. Pat Hoover, while being drive
on Hwy. 55 near Garrick, Saskat
chewan, in February, 1973, by he
husband, Staff Sergeant Warren Hoove
R.C.M.P., saw a very large, light brow
animal with a long tail, which sh
described (with her hands) as bein
about 2-1/2″ in diameter at the base. "
looked like a great big pussy cat." Th
animal was running parallel with the ca
at a distance "as far as from here t
across the street." Mrs. Hoover's 1
year-old son, Craig, also saw the anim
but her entreaties, unfortunately, we
not sufficient to cause her husband t
stop the car.(13)

There is no doubt that cougars occ
in the Nipawin area of Saskatchewan.
is hoped that they may continue to mo
freely about, to live their lives their wa
and not be forced through th
predations of man to "hole up" in th
Wildcat Hill Wilderness Area deep
the Pasquia Hills.



Cougar print in the snow.

History Of
RACCOONS
In Saskatchewan

by C. STUART HOUSTON and MARY I. HOUSTON*

On four trips in 1972, we saw a total nine dead raccoons on Saskatchewan ads. Since we had not ourselves seen a ccoon, dead or alive, in our many usands of miles of travel yearly, this ggested an increase in the numbers of is species. Our personal observations re as follows:

1. Three miles east of Leslie, May 20.
2. Three miles east and 7 miles south Southey, May 21.
3. Between Bulyea and Earl Grey, ay 21 (a large pregnant female, three es the weight of the others, had been led the preceding night).
4. Near Delisle, July 3.
5. Near Hitchcock, August 14.
6. Near Roche Percee, August 14.
7. Two miles east of Redvers, August .
8. One mile north of Whitewood, Oc- er 17.
9. Three miles west of Wauchope, Oc- er 17.

From the late 1920's until the early 60's, the raccoons seemed largely nfined to the valleys of the Souris and 'Appelle river systems. They like to near water and stream valleys are ir favourite habitat. Of the eight road ls above, six are near these two valley tems, suggesting that these are still ir areas of greatest abundance.

Daniel Harmon in 1820 had not en- untered raccoons on the Assiniboine, an or Saskatchewan Rivers, for he d it is "never found farther north an about latitude forty-eight."[4] In 29, Richardson stated that it was und as far north as Red River, in itude 50°, from which quarter about e hundred skins are procured an- lly by the Hudson's Bay Company."[6]

The first mention of the raccoon in Saskatchewan, to our knowledge, was in the report of the Saskatchewan Game Commissioner for the year ending June 30, 1919:

"Mr. W. V. Hemingway, of Poplar Grove, reports that a raccoon was trapped in the poultry house of James May, section 3-14-2 west of the 2nd meridian and that the skin is still in possession of the trapper. As this animal is not considered to be a native of the province the record is of scientific interest." (The location was the banks of the Pipestone Valley, about seven miles north and four miles east of Langbank.)

The report of the Saskatchewan Game Commissioner for the year ending April 30, 1925, contains the following statement:

"The raccoon is not recognized as a Saskatchewan fur bearer, therefore it is worthy of note that at least three specimens were taken in the province last year. One at Carlyle, the pelt of which is in the provincial museum; another a few miles from Melfort, and of the third, Mr. S. Lee Fraser of Tate writes, under date of March 31, 1925, as follows: 'One day last week, Mr. W. C. Mackenzie, a farmer living three and a half miles south of here, was shovelling snow from a concrete culvert . . . on looking into the culvert he found a full grown raccoon.' "[3]

Bradshaw added that "These are very interesting records, and in view of the fact that the pelts were taken at such widely distributed points, it would almost appear that for some reason or other the raccoon is extending its range westward." Thus the raccoon first appeared on the annual "Statement showing the number and kinds of furs bought in Saskatchewan" for the fur

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3 University Drive, Saskatoon, Saskatchewan

Decade*	Skins sold per year	Total	Average Per Year	Averag Pric
1931-1940	5, 14, 16, 26, 19, 3, 2, 5, 4, 1	95	10	$3.9
1941-1950	0, 0, 8, 1, 6, 9, 55, 174, 2, 8,	263	26	$3.3
1951-1960	23, 18, 9, 17, 27, 54, 21, 40, 39, 82	330	33	$1.7
1961-1970	92, 60, 74, 69, 43, 109, 173, 134, 179, 289	1222	122	$4.0
1971-1972	174, 290	464	232	$7.0

*Each year begins on July 1 and ends June 30.

year ending June 30, 1925; four raccoons were listed at an average value of $4.

For the next three years, the Saskatchewan trapping totals were one, five and four, respectively, with the average value at $5.00 for the latter two years. Totals were not published for the years ending in 1929 and 1930. For the next four decades, raccoon skin sales were as follows:

From 1947 through 1962, prices averaged below $3.00. The lowest price per pelt was $1.05 in 1952; the highest was $9.04 in 1969.

Coincident with the increase in numbers documented above, there has been an extension of the raccoon's range in Saskatchewan. A single record for Meadow Lake was the only record north of the Qu'Appelle Valley mapped by Beck in 1958.[1] (Beck omitted the original records from Tate and Melfort). Harris reported two records for the Saskatoon area, as well as records from Semans and Raymore, between 1967 and 1971.[5]

In June, 1971, Frank Hough and Scott Hale found a fresh roadkill on Highway 14 where it meets Clarence Avenue just south of Saskatoon, and they also found raccoon tracks along th river in the summer of 1972. As yet, w have not encountered raccoon predatio of nearby bluebird houses, though this said to be common along bluebird hous routes in the United States.

Raccoon Christine Skinner

A more northerly record came to m from W. L. Anderson of Christophe Lake. In mid-March, 1972, while retu ning home from a carnival after mi night, a raccoon ran from the ditch an across the road in full view 20 yar away. He studied its tracks carefully an realized he had seen similar tracks o several occasions in the past two year He also learned that Bill Crothers h shot a raccoon near his home Christopher Lake in the winter of 196 70 and Gilbert Charles had trapped o on the Little Red River, 7 miles west Northside, the same winter.

Almost as far north was the raccoo seen 3 miles south and 1 mile west Mullingar on September 15, 1968, Ralph Cowell.

Since the raccoon is largely a noctu nal mammal, naturalists should learn recognize its distinctive tracks, with fi prominent toes on each foot. The pho shows a raccoon staring (at Christi Skinner) from the bottom of the blow of a Case separator near Indian Head

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[1] BECK, W. H. 1958. *A guide to Saskatchew Mammals.* Sask. Nat. Hist. Soc. Spec. Pub. Regina. 52 pp.

[2] BRADSHAW, F. 1920. *Report of the Chief G Guardian.* In Annual Report Dept. Agricult Regina. p. 28.

[3] BRADSHAW, F. 1925. *Report of the Chief Ga Guardian. In* Ann. Rep. Dept. Agricultu Regina, pp. 22-23.

[4] HARMON, D. W. 1820. *A Journal of voyages travels in the interior of North America.* Flagg a Gould, Andover, 432 pp.

[5] HARRIS, W. C. 1971. *Some recent Saskatche raccoon records.* Blue Jay 29: 214.

[6] RICHARDSON, John. 1829. *Fauna Bore americana, Part I, Mammalia.* John Murray, L don, pp. 36-37.

INFORMATION WANTED

Assistance is requested in gathering information on two large mammals that are rare or uncommon in Manitoba.

The Mule Deer was once common in the province, especially in the southwest. Occasionally Mule Deer are shot during the hunting season, but otherwise there is little information on their present status in the province.

There are enough records on hand now to indicate that the Mountain Lion or Cougar occurs in very limited numbers in several areas of the province. Since it feeds chiefly on White-tailed Deer it may even be more abundant now than formerly.

Additional records of Mule Deer and Cougars are needed. Both old and recent observations are equally useful and worth reporting. Reports of sightings should be as detailed as possible.

All records will be acknowledged and a final report on these two interesting animals will be sent to all cooperators.

MERLIN W. SHOESMITH
ROBERT W. NERO
Building 2,
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Winnipeg, Manitoba. R3C 0V8

VIOLETS

Of Saskatchewan

by VERNON L. HARMS*

Among the truly delightful wildflowers of the prairies and woods are the violets spring and early summer. The rarity of some violet species makes finding them n more enjoyable. This paper lists the violets found in Saskatchewan, tells how to ntify them, describes their habitat, and indicates their known range in the vince.

Violets are small herbaceous plants, mostly 2 to 15 inches high. They have aterally symmetrical flowers with five sepals and five petals — a pair of upper als, a pair of lateral petals, and a lower petal that has a backwardly extending r (see Fig. 1). The petals are often bearded (hairy) on the inner surface at the oat. There are five stamens closely surrounding the single pistil, with the lower r spurred, the spurs extending into the spur of the petal. The ovary of the pistil ures into an elastic 3-valved seed pod containing several to many seeds. This d pod opens explosively, shooting the seeds out for some distance. Some of the vers of each plant are usually self-fertilized without ever opening. The leaves of lets are often, but not always, heart-shaped or kidney-shaped, with quite

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ser Herbarium,
artment of Plant Ecology,
ersity of Saskatchewan,
atoon, Saskatchewan.

prominent stipules, which are a pair of appendages at the base of the leaf stalk (
Fig. 1). The leaves, arise either from along the erect stems or else directly from
rootstock at the plant base.

Eleven species of violets are known to occur in Saskatchewan. Of these, th
species — the Field Pansy, Pansy and Wild Pansy — are introduced annuals wh
have occasionally escaped near cultivated areas. Of the eight native perenn
species, three are quite rare — the Kidney-leaved Violet, Great-spurred Violet a
Marsh Violet — leaving only five fairly common violet species in Saskatchewan
the Crowfoot Violet, Northern Bog Violet, Yellow Prairie Violet, White Wo
Violet and Early Blue Violet. The following key may be used to identify the
species of violets in the province:

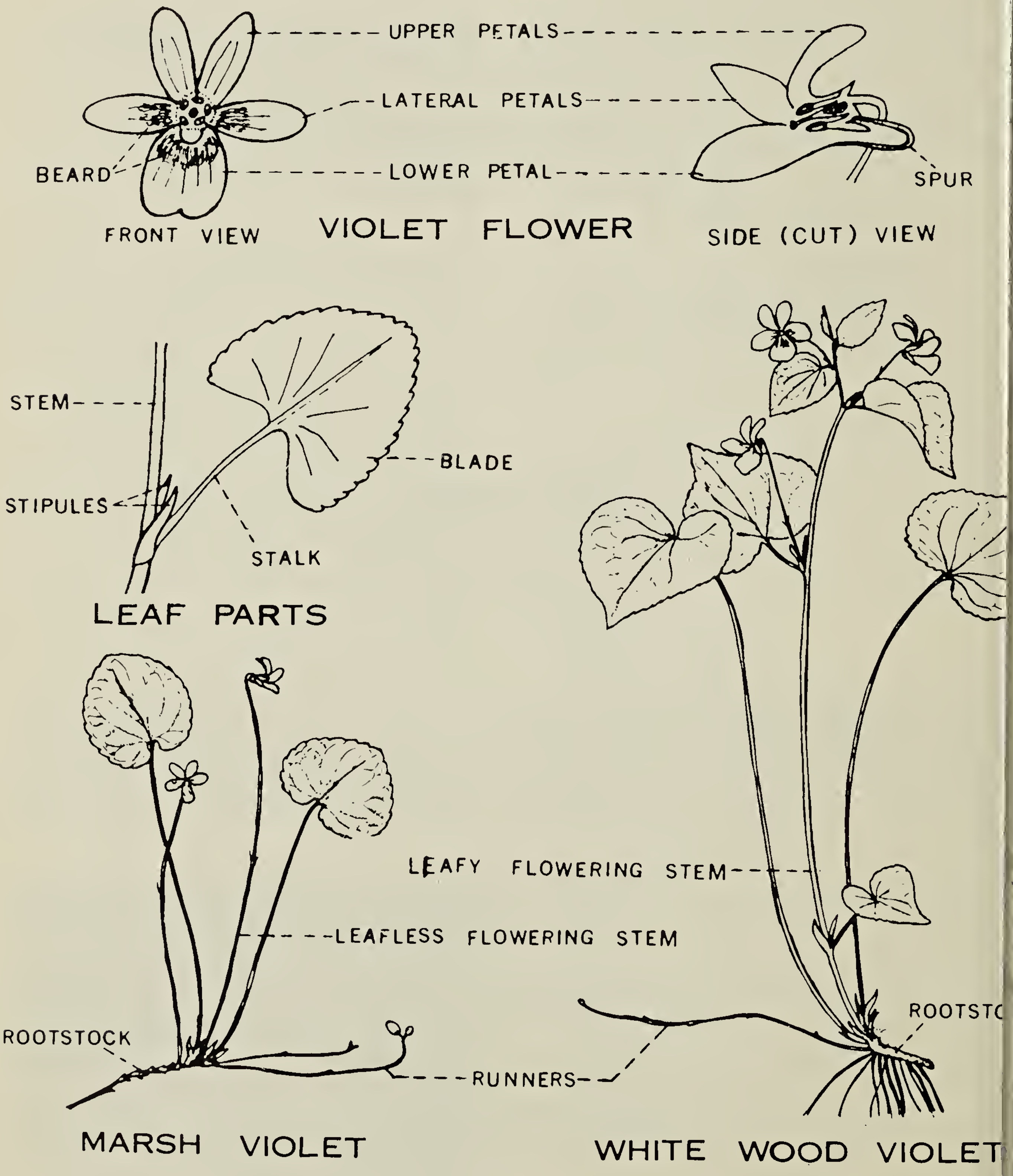


Fig. 1. Parts of a typical violet flower and leaf; whole plants of Marsh Violet and White W
Violet showing a leafless flowering stem and a leafy flowering stem, respectively.

IDENTIFICATION KEY TO THE SASKATCHEWAN SPECIES OF VIOLETS

If the flowering stems lack leaves, with all leaves arising from the rootstock at the plant base or from runners, see 2a or 2b.

If the flowering stems bear leaves, see 6a or 6b.

2a) If the flower petals are white with deep red or purple lines (rare plants of moist woods), the plant is —

Kidney-leaved Violet *Viola renifolia* Gray

2b) If the flower petals are blue or violet, or, if white, without deep red or purple lines, see 3a or 3b.

If the leaves are deeply divided lengthwise into segments (widespread plants of dry sandy prairies), the plant is —

Crowfoot Violet (Prairie Violet) *Viola pedatifida* G. Don

If the leaves are not deeply divided or lobed, merely shallowly toothed, see 4a or 4b.

4a) If the plants have thick rootstocks, lack slender runners, and have the lateral petals long-bearded at the throat (common plants of bogs, marshes, and moist woods), the plant is —

Northern Bog Violet *Viola nephrophylla* Greene

4b) If the plants have slender rootstocks and runners, and the lateral petals are not or are only slightly bearded, go to 5a or 5b.

If the leaves have appressed hairs above and the basal lobes strongly converge toward the sinus, and if the flower spur is conspicuously long, at least two-thirds the length of the petal blade (rare plants in northern woods), the plant is —

Great-spurred Violet (Selkirk's Violet) *Viola selkirkii* Pursh

If the leaves are not covered with hairs and the basal sinus is open with flaring lobes which do not converge toward the sinus, and if the flower spur is much shorter than two-thirds the length of the petal blade (rare plants of moist woods), the plant is —

Marsh Violet *Viola palustris* L.

6a) If the stipules (pair of appendages at base of leaf stalk) are not leaflike, not divided, and are much smaller than the leaf blades, and if the plants are perennial, see 7a or 7b.

6b) If the stipules are leaflike, deeply lobed or divided, about as long as the leaf blades, and if the plants are annual, go to 9a or 9b.

If the flower petals are yellow and the leaves are usually narrow and lance-shaped, but sometimes broader, often, but not always, tapering to the base (frequent plants on dry prairies), the plant is —

Yellow Prairie Violet *Viola nuttallii* Pursh

If the flower petals are not yellow except sometimes at base and the leaves are not narrow and lance-shaped, not tapering to the base, see 8a or 8b.

8a) If the flower petals are white to violet with a yellow base, the flower spur short, and stipules not toothed (common plants of aspen woods), the plant is —

White Wood Violet (Western Canada Violet) *Viola rugulosa* Greene

8b) If the flower petals are blue to violet, the flower spur at least twice as long as thick, and stipules toothed at the base (common plants in moist prairies and open woods), the plant is —

Early Blue Violet (Hooked Spur Violet) *Viola adunca* J. E. Smith

9a) If the flower petals are yellow, about as long as sepals, and stems are finely hai along angles (rare plants in sandy cultivated areas), the plant is —

Field Pansy (Wild Pansy) *Viola arvensis* Murr

9b) If the flower petals are 1-1/2 to 3 times as long as the sepals, see 10a or 10

10a) If the petals are large, variously multicoloured purple, yellow or whi with yellow centers; if the distance between the leaves along the stem is less th the leaf size; if the leaf blades are rounded or heart-shaped at the base, and the stems are finely hairy along angles (infrequently escaped plants in a around gardens), the plant is —

Pansy (Johnny-jump-up) *Viola tricolor*

10b) If the petals are smaller, bluish white to cream-coloured, tinged wi violet on outside; if the distance between leaves along the stem is greater th the leaf length; if leaf blades are tapered to the base, and if stems are not hai (rare plants in fields, lawns, or gardens), the plant is —

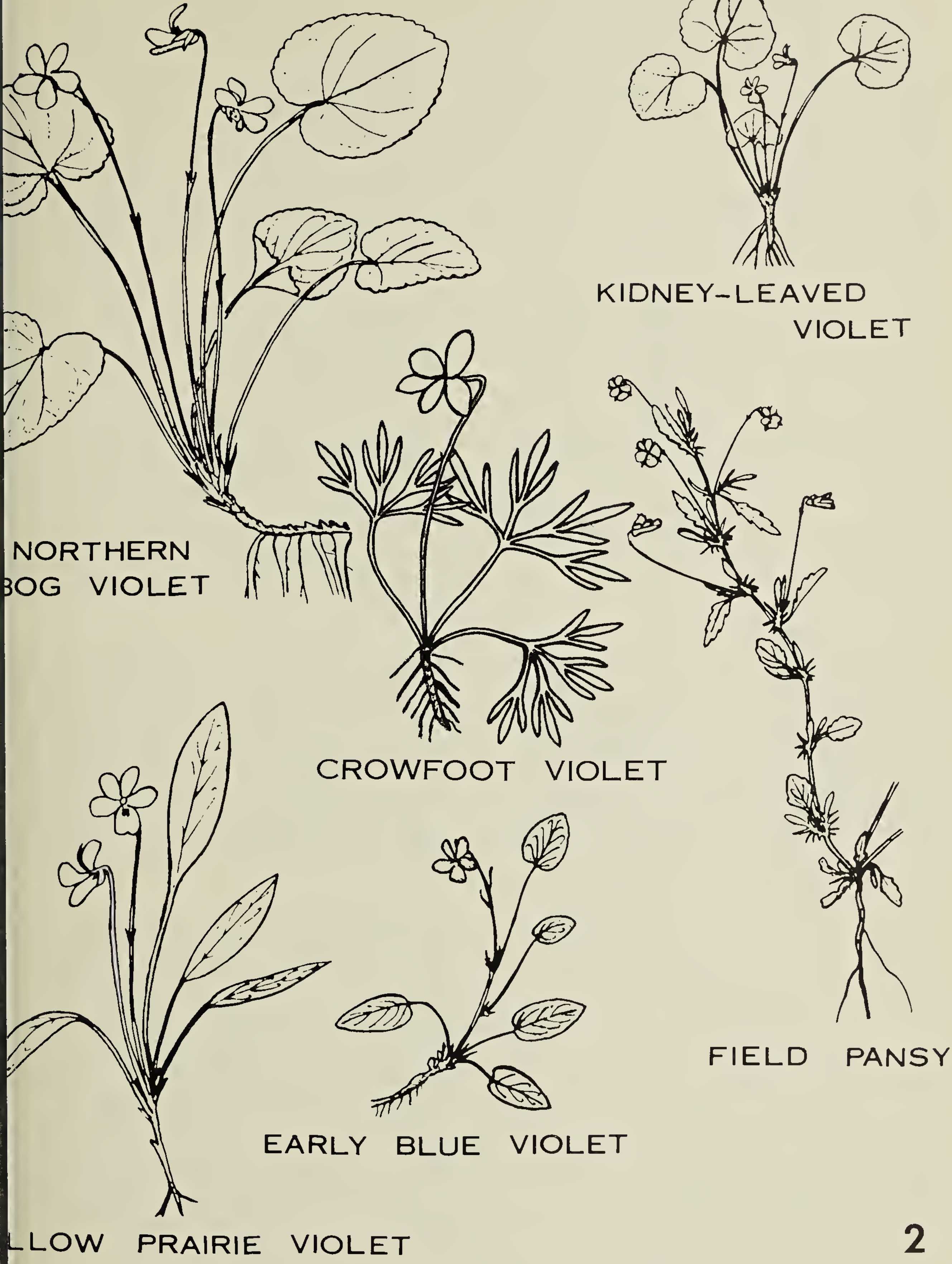
Wild Pansy (Johnny-jump-up) *Viola rafinesquii* Gree

1. The KIDNEY-LEAVED VIOLET (*V. renifolia*, Fig. 2) is relatively uncor mon in Saskatchewan, occurring in moist woods in the Cypress Hills and t southern edge of the northern forest. The flowers are small, about 1/3 to 1/2 in long including the short spur, borne on leafless stems which are usually shorter th the leaves. The petals are white, all beardless, with the lower ones red- or purpl lined. The seed pods are purplish and contain brown seeds. The leaves are kidne shaped, 1 to 3 inches wide, usually hairy at least beneath, with rounded teeth, a borne on leaf stalks arising from upright rootstocks that are slender when young b become thick and scaly with age.

2. The CROWFOOT, LARKSPUR, or PRAIRIE VIOLET (*Viola pedatifid* Fig. 2) is widespread on prairies and exposed banks in the southern third of Sask chewan, but is seldom abundant at any site. The most characteristic feature of t violet is the leaf which is divided nearly to the base into segments and these segme cleft again into narrow lobes. The leaves have rather short stalks which arise fr short erect rootstocks. The flowers are large and showy, 1/2 to 1 inch long, 1 to 1/2 inches wide, borne on erect leafless stems mostly overtopping the leaves. T petals are bright purple with the lateral and lower petals long-bearded. The se pods are yellowish-grey containing light brown seeds.

3. The NORTHERN BOG VIOLET (*V. nephrophylla*, Fig. 2) is one of our m common bluish violets in bogs, marshes, and moist woods. It has round to hea shaped or kidney-shaped leaves, 1-1/2 to 2-1/2 inches across, bluntly pointed, a smooth-surfaced, lacking hairs. The flowers are large, 1/2 to 1 inch long, borne leafless stems which are about as long or somewhat longer than the leaves. The l stalks arise from a short, thick rootstock. The petals are violet-coloured, the lo three whitish at the base and bearded, and the lowest one with only a short spur. T seed pods are green with olive-brown seeds. A white-flowered form of this specie rare, but has been collected at Wallwort, Sutherland (Saskatoon) and Rosthe Saskatchewan.

4. The GREAT-SPURRED or SELKIRK'S VIOLET (*V. selkirkii*) is a rare pl in the province known only from Amisk Lake and the Cumberland House area northeastern Saskatchewan. This violet is rather small and delicate with a long sl der rootstock bearing heart-shaped leaves with narrowed basal sinuses and round teeth. The flowers are about 1/2 inch long, borne on leafless stalks. The petals pale bluish-violet, all beardless, with the spur of the lower petal about 1/4 inch, long as the blade. The seed pods are short, often dotted with purple, with bu coloured seeds.



2. Habit sketches of six Saskatchewan species of Violets.

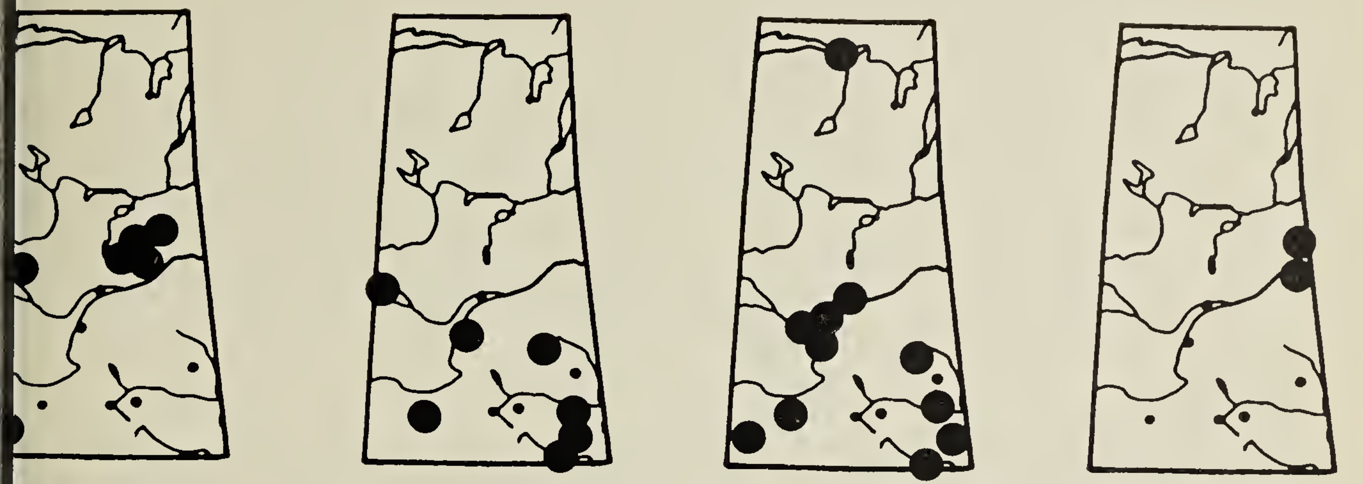
5. The MARSH VIOLET (*V. palustris,* Fig. 1) is a rare plant of wooded areas Saskatchewan which has been reported from Prince Albert National Park, Muenst McKague, Wallwort, Candle Lake and the Hasbala Lake area. This delicate pl has long slender rootstocks and numerous runners which bear long-stalked, kidn shaped leaves 1 to 1-1/2 inches broad, smooth-surfaced, with shallow rounded te and broad basal sinuses. The flowers are about 1/2 inch long, borne on leafl stems which are usually shorter than the leaves. The petals are pale violet w darker purple veins. The lower petal has a short pouch-like spur. The seed pods green with greyish seeds. A white-flowered form occurs in the species but has not been reported from Saskatchewan.

6. The YELLOW PRAIRIE VIOLET (*V. nuttallii*, Fig. 2) is a fairly comm plant of the prairies in the southern third of Saskatchewan. The leaves are fin hairy, smooth or wavy-margined, narrowly lance-shaped to sometimes broadly e shaped, usually tapering to short stalks. Most of the leaves arise basally from a sh stout rootstock, but at least some occur on the aerial stems which bear the flowe The flowers are about 1/2 inch wide, 1/4 to 1/2 inch long, borne on stems that more or less leafy. The petals are bright yellow with the lower three purple-veine the base and often brownish tinged on the outside. The lateral petals are of somewhat bearded and the lowest petal has a short spur. There are both narr leaved and broad-leaved forms of this species. The forms with leaves rounded at tip and not tapering to the base are sometimes separated as another species, *Vi* *vallicola* A. Nels., but this does not seem warranted.

7. The WHITE WOOD VIOLET (*V. rugulosa*, Fig. 1) is a common species aspen and other woodlands, often forming extensive patches. The flowering ste bearing several to numerous leaves, arise from slender rootstocks and from the m long runners which are present. The heart-shaped leaves have rounded teeth long stalks. The large flowers are borne on the upper portion of the stem on sta shorter than the leaves. The petals are up to 1/2 inch long, white to violet, yellow bases, the lower ones purplish-veined. The lateral petals are long-beard and the lowest one has only a short spur. The rough-surfaced seed pods are cove with fine hairs and contain brownish seeds.

8. The EARLY BLUE or HOOKED SPUR VIOLET (*V. adunca*, Fig. 2) i common plant in Saskatchewan on both moist low prairies and open pine woo The leaves are mostly basal from a woody rootstock, but the flowering stems usu bear several leaves, although the earliest flowers may be on leafless stems. The lea are nearly circular or elliptical, 1/2 to 1 inch wide, hairy-surfaced, with shall rounded teeth, on either short or long stalks. The stipules are mostly toothed at base. The flowers are 3/8 to 5/8 inch long, with blue or deep violet petals, the lo three are often whitish-based and with darker purplish veins. The lateral petals white-bearded. The spur of the lowest petal is conspicuous, about 1/4 inch lo slender, and often somewhat hooked. The white-flowered form of this species been reported from Rosthern. A form with hairless leaves and untoothed stipules been reported from near Flin Flon, Manitoba.

9. The FIELD or WILD PANSY (*V. arvensis*, Fig. 2) is an introduced Europ annual plant that occurs only rarely in Saskatchewan on sandy soil in or near g dens or cultivated fields. It has been reported only from Wilkie, Tisdale and Can in the province. The flowering stems are leafy, often branched from the base, h on the angles, and bearing small flowers about 1/2 inch long and 1/3 inch wide. petals are pale yellow, often with purplish tips, and about as long as the sepals. spur of the lower petal is short. The stipules are leaflike, nearly as large as the lea and their edges are dissected from the base into narrow segments. The lower lea are nearly circular or egg-shaped, tapering at the base and rounded at the tip. upper leaves are narrower. The seed pods are nearly round, containing brown see

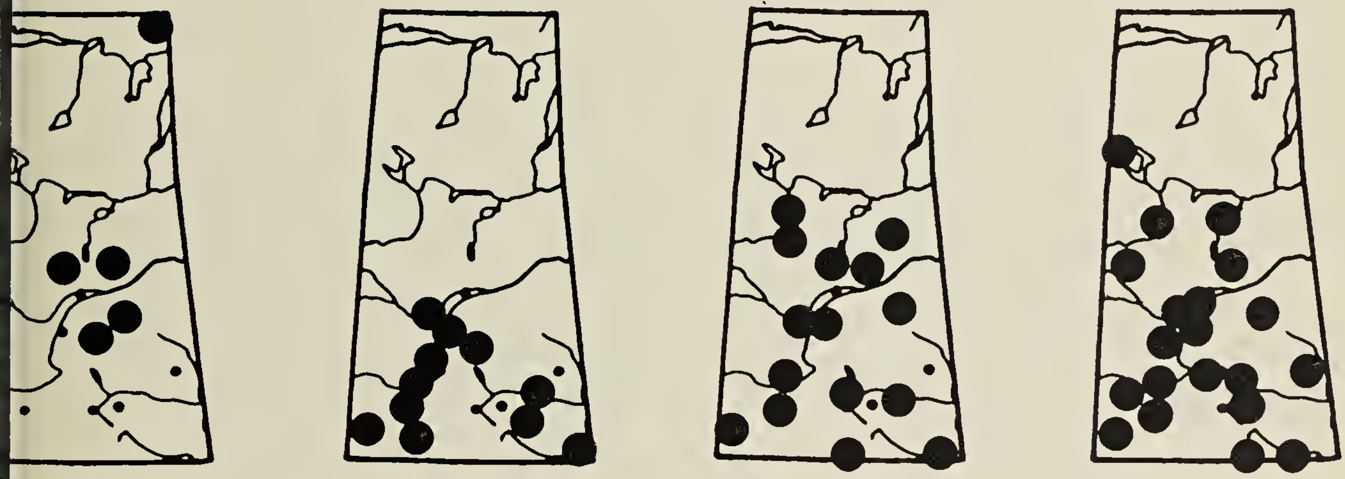


/. renifolia
NEY-LEAVED VIOLET

V. pedatifida
CROWFOOT VIOLET

V. nephrophylla
NORTHERN BOG VIOLET

V. selkirkii
GREAT-SPURRED VIOLET

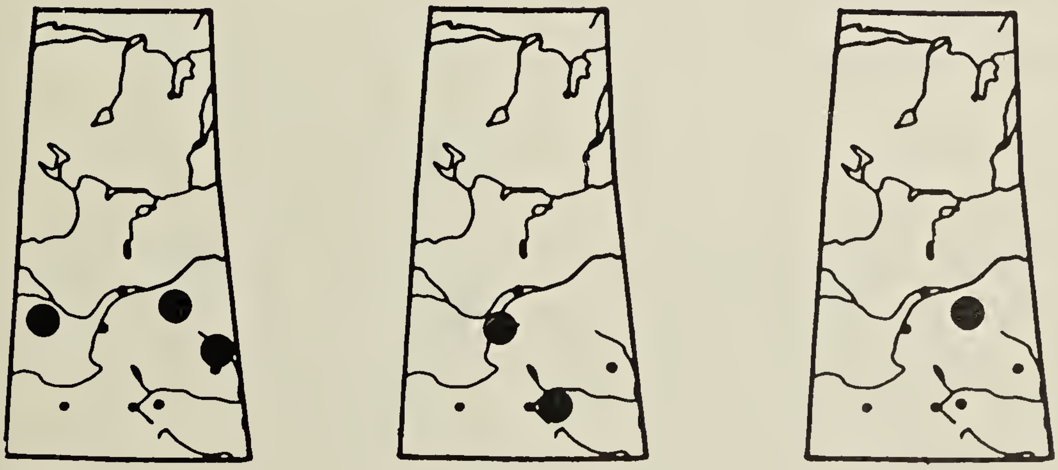


. palustris
RSH VIOLET

V. nuttallii
YELLOW PRAIRIE VIOLET

V. rugulosa
WHITE WOOD VIOLET

V. adunca
EARLY BLUE VIOLET



V. arvensis
FIELD PANSY

V. tricolor
PANSY

V. rafinesquii
WILD PANSY

3

3. Distribution maps showing locality records of each Violet (*Viola*) species in Saskat-
ewan.

10. The PANSY (*V. tricolor2*) is a large-flowered annual plant introduced fro Europe, which is commonly cultivated and may casually reseed itself in and aroun gardens. The cultivated pansy is the product of horticultural hybridizations an many different colour and size forms occur. The flowers of escaped plants ar usually 1/2 to 1 inch wide, although the flowers are often larger under cultivatio The petals are widely spreading, about twice as long as the sepals, variousl multicoloured with purple, yellow and white, and with yellow centers. The uppe petals are usually darker coloured than the lower ones. The flowering stems are leaf and often branched from the base. The lower leaves are circular or heart-shaped; th upper ones are narrower. The stipules are leaf-like, about as long as the leaves, an the edges are dissected from the base into narrow segments. This species sometimes i also called Heart's Ease, Ladies-Delight or Johnny-jump-up.

11. The WILD PANSY or JOHNNY-JUMP-UP (*V. rafinesquii*) is a rare introduced annual plant from Eurasia. The only Saskatchewan report has been from grain field at Tisdale. The plants have slender, leafy flowering stems which ar hairless and often branched at the base. The leaves are small, only 1/4 to 1/2 inc wide. The lower leaves are nearly circular, smooth, shallowly round-toothed, rounded at the tip. The upper leaves are narrower and long-tapering to the base. Th stipules are leaf-like, almost as long as the leaves, and lobed at the base. The flower are small, less than 1/2 inch long, long-stalked, with bluish-white to creamy petal which are nearly twice as long as the sepals.

The known distribution of the eleven violet species in Saskatchewan is shown o the maps of Figure 3. Each map dot indicates a documented locality record. Th distribution maps were prepared from published records and specimens in the Fras Herbarium. They still reveal a paucity of specimen records for many of the specie The discovery of new locality records, especially of the rarer violet species or form is of considerable interest to us and we would welcome any such reports particularl if documented by a pressed dried specimen. Any such information may be addresse to the Fraser Herbarium, University of Saskatchewan, Saskatoon.

Additions to the FLORAL LIST Of Saskatchewan – 1972

by JOHN H. HUDSON*

Although I did not accomplish as much botanizing in the field season of 1972 as in some former years, yet a modicum of records never or seldom reported for Saskatchewan came my way this summer. These will now be set forth. The collection numbers are those of the author. Duplicates have been deposited in the Fraser Herbarium of the University of Saskatchewan (SASK) and, except for No. 2774, in that of the Department of Agriculture at Ottawa (DAO).

No. 2772. *Lotus corniculatus* L Bird's-foot Trefoil, Saskatoon, S. ed SE 1/4 34-36-V W.3rd, south sid Highway No. 5 between Cumberlan and Preston Avenues, June 16, 197 abundant with brome grass, quack gra and yellow sweet clover. This legum may be recognized by its genera similarity in habit to yellow alfalf even to the yellow flowers borne i rounded heads. However, the heads ar axillary on long stalks, not termina and the flowers are much larger, som 1.5-2 cm long overall, with a coroll bright yellow tinged with brown on th gs. The fruits are very different from e of alfalfa, being long-cylindric, 2- n long by 2 mm in diameter, and ading in all directions from a com- point of origin.

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*103 Richmond Crescent, Saskatoon, Saskatchewan

t the spot the plant gave the im- ssion of having spread from ivation. It is however, not ascribed askatchewan by Boivin.[2] An earlier rt for Saskatchewan by Ledingham been referred by Boivin to the ely related species *L. pedunculatus* .[6] [2]

otus corniculatus was brought to my ntion by Dr. W. Steck of Prairie ional Laboratory, National earch Council, who wanted this me identified for biochemical ies.

o. 2774. *Atriplex rosea* L., Red- , Regina, boulevard in the 2000 k Hamilton St., a few plants, July 1972. The plants were in flower, h is not the right time to collect *plex*, as the specific characters are ly in the fruit; yet I reasoned I'd r make a collection right then in the city employees got zealous and d up the boulevard. I took only two ts for fear of reducing the colony's ce for survival too greatly. By Sep- er 10, the plants had been mown, the lower branches were fruiting. such fruiting branches were added e collection.

his weed of European origin, com- in the USA, is not recorded for atchewan by Breitung.[3] Boivin rded it only from Ontario and B.C. anada.[1] As it is plainly a plant of ner climates, its chances for survival Saskatchewan, even in cities, are . To the ordinary viewer it will just about like our Saltbush *iplex patula* L.) except that the es are coarsely toothed on the ins.

he find of the summer was *Polygala icillata* L., Whorled Milkwort, cted as No. 2777, on L.S.D. 12 in -VIII W 2nd, west of Estevan, July 1972, stony dry coulee bottom. , too, appears unreported for atchewan, though reported for Manitoba by Scoggan and Boivin, and for North Dakota by Stevens.[8] [2] [9] It is a small annual with terminal racemes of pale mauve flowers and narrow linear leaves in a few whorls. It has the build of *Plantago purshii*, Pursh's Plantain, with which it was growing, but the dense terminal racemes much resemble those of *Polygala alba*, White Milkwort, which was growing here amid rocks further up the valley sides.

Apparently not a record, but still very gratifying, was the finding of *Sporobolus neglectus* Nash, Small Dropseed, also at Estevan. The collection was No. 2831, September 13, 1972, SE 1/4 22-2-VIII, south of Estevan hospital, arid disturbed flat of Souris River valley, soil mostly Ravenscrag sandy clay. It is not recorded for Saskatchewan by Breitung but Boivin (1967a) assigns it a range from Quebec to Alberta.[3] [1] Moss gave it for Medicine Hat, which accounts for the Alberta citation.[7] From Saskatchewan's being included in the range I should guess that Boivin must have collected it himself at Estevan. We have no specimens from Saskatchewan in the Fraser Herbarium.

It is hard to make up a thumbnail description of this annual grass unmistakably enough so that others may recognize it, as is my aim in these yearly notes. One may write that the narrow panicles are mostly included in the sheaths, as is the case in Common Speargrass (*Stipa comata*) without conveying much of a picture. The flowers and spikelets are much like those of Sand Dropseed, (*Sporobolus cryptandrus*), but the panicles are not at all spreading as in the latter. Perhaps the easiest field mark is that said included panicles are not confined to the tip of the culm, but that a panicle, wrapped in the sheath of the leaf, is borne in the axil of each of the 2 to 6 stem leaves all the way down each culm. This is very unusual among our grasses.

In my last year's note on botanical records for Saskatchewan, *Spergula arvensis* L., Spurry, was claimed as new to the province.[5] This is now known to be erroneous, at least two earlier records having turned up. The subject is treated in another publication, Harms and Hudson (in press).

[1]BOIVIN, B. 1967a. *Énumération des plantes du Canada.* Provancheria No. 6, Université Laval, Quebec; originally published in Naturaliste Canadien in parts over 1966 and 1967.

[2]BOIVIN, B. 1967b. *Flora of the Prairie Provinces, Part I.* Provancheria No. 2, Université Laval; first published in *Phytologia* in parts, 1967.

[3]BREITUNG, A. J. 1957. *Annotated Catalogue of the Vascular Flora of Saskatchewan.* Am. Midland Nat. 58: 1-72.

[4]HARMS, V. L. and J. H. HUDSON (in press) *Some New or Noteworthy Vascular Plant Records from Northwestern Saskatchewan.* Submitted to Rhodora.

[5]HUDSON, J. H. 1972. *1971 Botanical Records for Saskatchewan.* Blue Jay 30: 122-4.

[6]LEDINGHAM, G. F. 1962. *First Report of Lotus corniculatus in Saskatchewan.* Blue Jay *20* [3], 120.

[7]MOSS, E. A. 1959. *Flora of Alberta.* University of Toronto Press.

[8]SCOGGAN, H. J. 1957. *Flora of Manitoba.* National Museum of Canada Bulletin No. 140, Ottawa.

[9]STEVENS, O. A. 1950. *Handbook of North Dakota Plants.* North Dakota Institute for Regional Studies, Fargo, North Dakota.

Wildflower
PHOTOGRAPHY

by G. A. HARDY*

Flowers are among the most popular, plentiful and accessible of all nature subjects. Most serious nature photographers begin with flowers. Yet too may flower pictures turn out trite and disappointing. This may be neither the fault of the subject or the photographer. It may also occur because of the difference between the way an object appears to the viewer and the way the camera records it. The mind's eye sees the flower in a three-dimensional vision that separates it from its surroundings and adjusts to motion and some color variations. The camera on the other hand sees with monocular or two-dimensional vision and hence places equal emphasis on all objects within its viewing range. Hence the rose that looks so lovely to the eye may be lost ami the leaves and branches wh photographed.

Except when the photographer's c ject is to show the whole plant and surroundings from an ecological a proach, far more satisfactory results c be obtained by using some form close-up photography as outlin below. This article can only outline t subject and I commend to my readers t vast storehouse of artistic and techni knowledge available in the hundreds excellent books available.

Equipment and its use.

A single lens reflex camera is a m since the photographer can then see t exact area that will be exposed to t film. By opening or closing the le diaphragm, the area (depth of field) sharp focus can be altered to suit t subject. A camera with interchangea lenses is best. A sturdy tripod with and vertical panhead is also a must. F subjects very close to the ground I us single leg unipod made of a 10″ spi with a 1/4 x 20 threaded 1/2″ screw-t

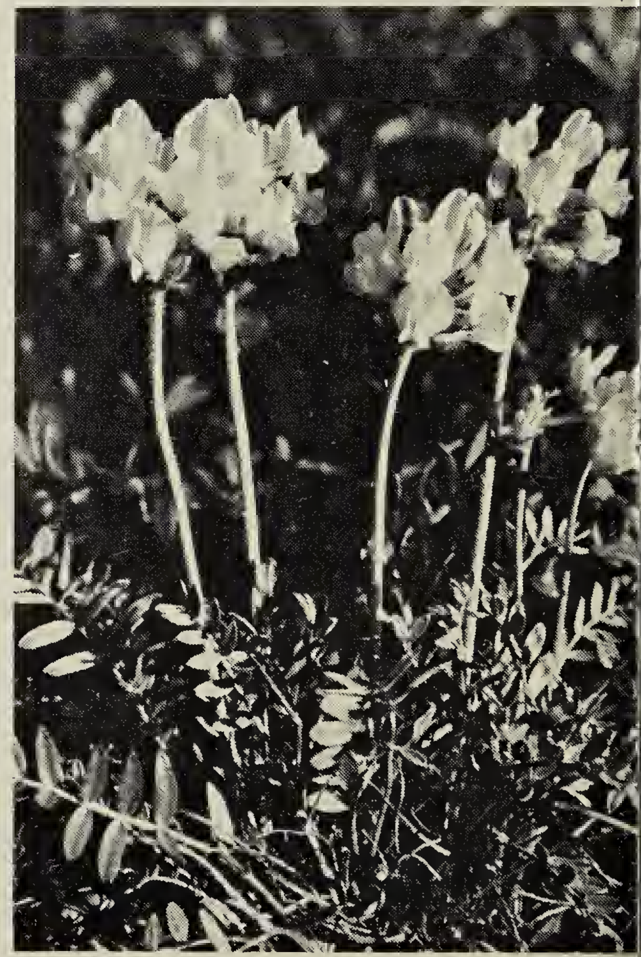

Fig. 1. Early Yellow Locoweed.

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*No. 803 - 640 Main Street E.,
Saskatoon, Saskatchewan

2. Marsh Marigold.

'e bolt soldered on the top. This :ad fits the hole in the base of most ieras. Only a firm and immovable : such as described will ensure sharp ures.

re are three types or ranges of tography.

) Normal lens pictures using the dard 55 mm lens will focus down to or 18″ and provide pictures of le plants and habitat as mentioned ve.

!) Close-up photography is generally :ribed as that range where some at- ment either behind or in front of the mal lens will allow the camera to is closer to the subject and thus vide a larger image on the film. erally the inside limit of this range irs when the object appears on the in life size, also referred to as a 1:1 ratio. This can be done by placing one or more close-up attachment lenses to the front of the normal 55 millimeters (mm) lens or a longer focal length lens of, say, 135 millimeters (mm). Close-up lenses come in varying strengths called diopters. I suggest a + 2 and a + 3 which, when used together, provide + 5, very adequate for close-up work. These on a normal lens place the camera very close to the subject; this can create lighting problems from shadows. Attachment to a 135 mm lens, while not providing as large an image, will allow a better working distance. Each increase in magnification results in a narrower depth of sharp focus; hence a smaller lens opening and slower shutter speed must be used to increase depth, while compensation by longer shutter time is made for the proper exposure. (Figs. 2 and 3)

Fig. 3. Western Red Columbine.

(3) Another method to obtain close-ups is by placing extension tubes or bellows behind the lens in those cameras with interchangeable lenses. When enough tubes or extension of the bellows yield an image beyond the 1:1 ratio, we are in that area of photography known as macro-photography. The more tubes, the more light is lost and this must be compensated for by longer exposures. For example, a life-size image obtained by this method requires 4 times the exposure and a 1/2-size image twice the exposure. This area of photography is used in pictures where you see stamens and pistils with all the structural detail and grains of pollen revealing colours not normally seen. (Fig. 4)

Lighting

One of the most common causes of disappointment is improper lighting. High bright sun from behind the camera yields flat and uninteresting pictures and often extreme loss of color saturation. Hazy sunlight is very good, and one should arrange the subject so that the light falls from about 45 degrees to one side or above. With some subjects, back lighting by the sun will produce dramatic effects but it is usually necessary to place a reflector near the camera to light to some extent the frontal area. The dull side of kitchen aluminum foil taped to cardboard is satisfactory. This can be held in place b clothes hanger wires stuck in the groun with one cut-off end curled like a pape clip to hold the card. (Fig. 5)

One of the most common causes c blurred pictures is movement due t wind. If this condition or weak light is problem an electronic flash at 4 degrees with the reflector to fill th shadow side is often used. Strobe light so fast that most object movement frozen. Be sure to purchase a unit th has an output or guide number of least 65 to 80 using Kodachrome film. An example of this type of lightin is shown in Fig. 6. Here again a refle tor to fill the shadow side is recommended.

Background

Another common fault in flowe photography is intrusion of backgrounds. In general, only a hint of th habitat area should be present in clos ups; otherwise bright leaves, stems an grasses distract the eye and preven proper separation of the main subjec Tie back the nearby foreign objects wit thread or vegetable bag clips. If th background is too bright, shadow it wit an umbrella or something simila

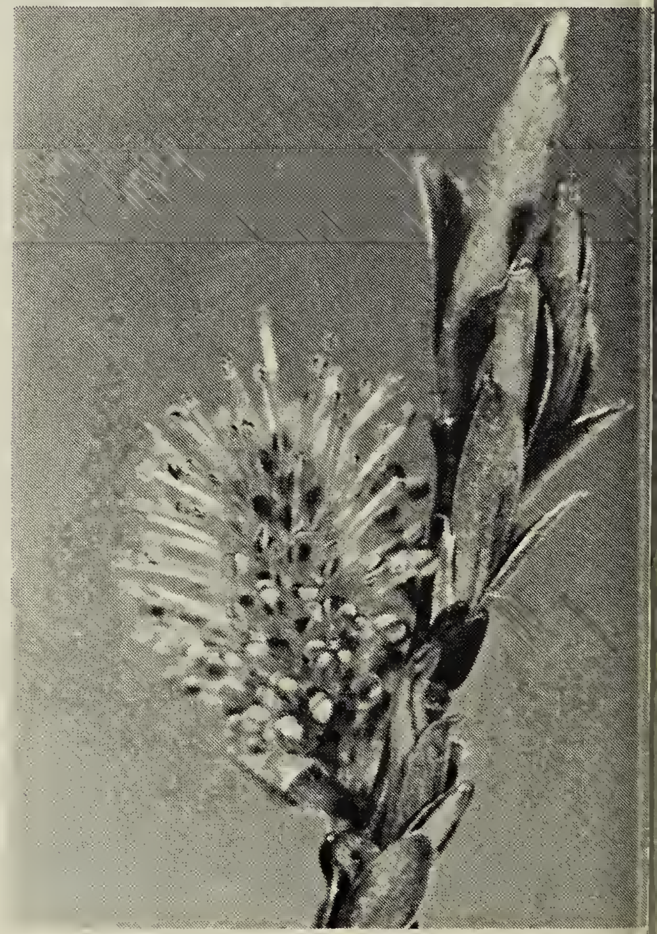
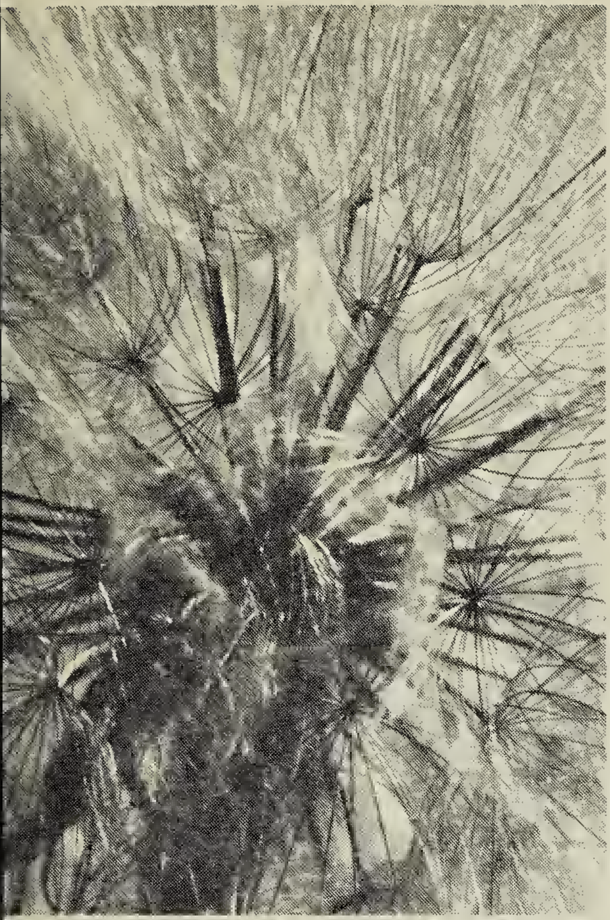


Fig. 4. Willow blossom.



5. Goat's Beard seedhead.

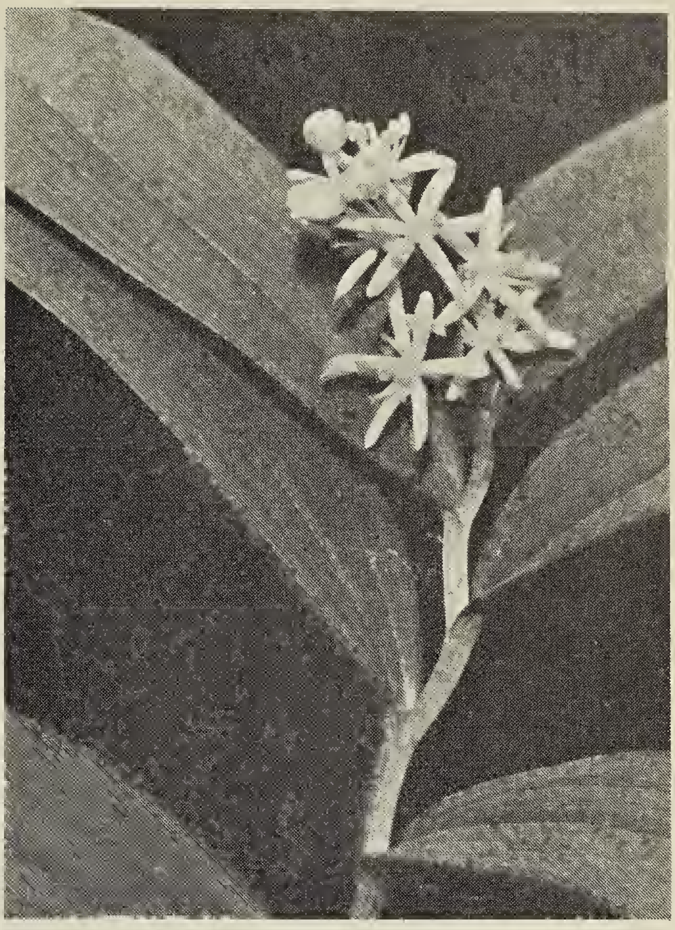


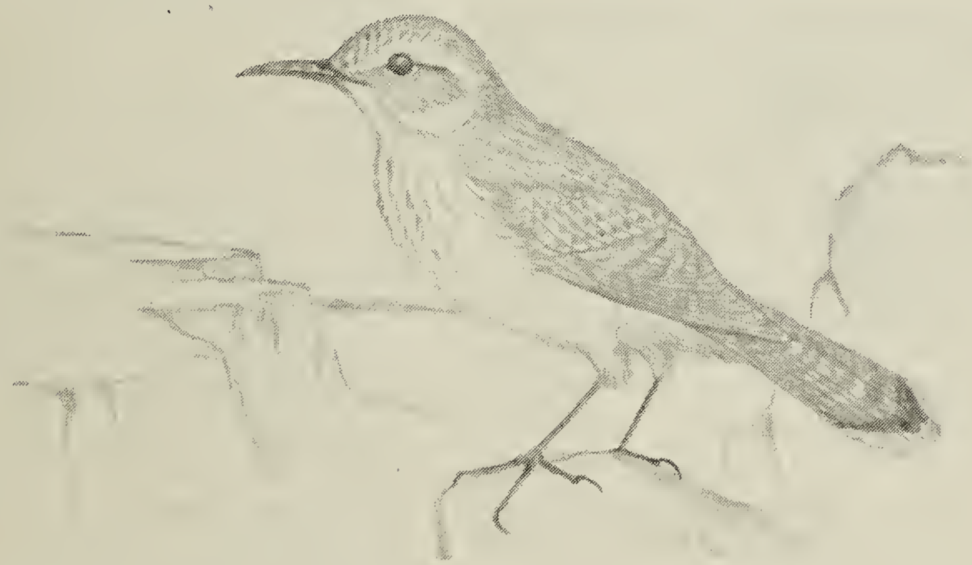
Fig. 6. Star-flowered Solomon's-seal.

ve all, limit the sharp focus area to r main subject and place the ground well out of focus as in Fig.

omposition is an extensive subject in f but a very necessary attribute to sing pictures. Since flower pictures themselves to pictorial treatment, composition within the frame ds static and uninteresting pictures. -in lines of leaves or stem may t the eye to the main subject which should seldom occupy the exact centre of the picture.

Summary

- A good single-lens reflex camera
- Sturdy tripod
- Lots of close-ups; move in
- Careful attention to lighting; make it look natural
- Selective focus to separate subject from background
- Pleasing composition or arrangements
- Above all, sharp subjects



Rock Wren

A. R. Smith

SEEING AND CREATING

An Artist Looks At Nature

by GRACE M. HOGG*

Travelling in Saskatchewan is a very exciting experience. Many beautiful places offer great opportunities to the nature lover and artist. To observe, to examine and to study all forms of living things is a pleasant, lifelong adventure. When the eye of the mind is opened, the vision is enlarged and enjoyment of nature's gifts becomes greater. This sharpened visual ability is enriched in all travelling experiences.

Seeing nature with all of one's senses is different from simply a quick glance. As one hikes along a prairie trail many senses are aroused. From the waving of grasses in the wind, one experiences the sensation of swaying to and fro. The wind making music in the grasses arouses one's sense of hearing. Then a person is spurred on to interpret feelings of the scene. All the surroundings glow with pulsating vitality and many fascinating colours are everywhere to be seen and enjoyed. It is this pulsating and colourful life that one wishes to become involved in. Sketching from nature is one kind of involvement.

Nature lovers can add another dimension to their list of activities by sketching. A large sketch-book, watercolours, a bottle of water, a large brush (size 12), and an open, seeing mind are all the requirements for a sketching trip.

It is surprising how much more an inquisitive eye sees, when looking at nature for its shapes and colours, rather than to identify the plant or animal. A winding path with its grassy edges may suggest curved and straight lines. In flat or sloping fields, one observes a variety of lines. Fluffy clouds are masses of subtle colours that sometimes display whirling shapes and lines in the sky. Along the bank of a creek one sees another intermingling of lines and colours. An old tree which has fallen into the water may suggest straight a broken lines. Noticing the rushi water, a person becomes aware of a p tern of wavy lines and sparkli colours. Countless numbers of flow in brilliant array, in fascinating sha and designs, are everywhere to stu and enjoy. Even sketching from on garden in winter can be qu fascinating. The sketches of old we and forms in the garden were made w a brush and india ink.

Weeds

Spontaneity and freshness are val qualities in sketching; these lie in the tist's conception and performan Using a large brush for painting insp spontaneity and encourages a fr more creative response. Each sketch new experience, a bringing of the ar into a vital connection with nature. viewer half closes her eyes and looks scene, trees become unified with s and fields; thus a harmony is obtai Likewise in sketches, harmony colours, lines and shapes is used to u a picture.

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*1014 - 7th St. E., Saskatoon, Saskatchewan

he garden in winter.

The painter selects and mixes water-ours to obtain various pleasing com-ations. Then with brushfuls of paint ours are applied on the paper in in-esting shapes and masses. An area of paper is covered with colours in such ay that the disposition of lights and ks is pleasing to the eye. Movement picture may be expressed by variety lines (curved, diagonal, horizontal, tical, etc.); also by advancing (warm s and yellows) and receding (cool es and greys) colours. The artist ects and eliminates colours, shapes l lines from a scene to compose a tch or painting which will be an in-idual impression and expression of seeing process.

Many quick sketches in colour and pe, in line and colour, or just in line be made from a single scene, each senting a different involvement with the creative activity of sketching. An artist becomes fascinated by relating form with form and colour with colour. Experimenting with colour to obtain unusual original effects can also be intriguing. One's imagination is stimulated as each colour is selected and applied on the paper. Soon the artist realizes the sketch or painting is a unified whole. One feels nothing more can be added and the creating experience is finished for that picture.

A person may sketch for pure enjoyment, or sketches may be made with the intention of capturing an idea, meant for permanent form as in a finished water-colour painting. Each sketching trip can be a joyous, invigorating event in seeing and creating. These wonderful experiences can be shared with those who view the finished sketches and paintings.

Saskatchewan

LIGNITE

Under A Microscop

by PAUL L. BROUGHTON*

During the geologic time period geologists call the Paleocene, a forested and swampy terrain covered southern Saskatchewan, western North Dakota and eastern Montana. Now, 60 to 70 million years later, this great expanse of temperate climate vegetation has been transformed into one of the largest lignite coal deposits in the world. This lignite-bearing series of sand, silt and clay is called the Ravenscrag Formation in southern Saskatchewan, but is known as the Fort Union Formation in the adjacent northern American states.

Today, the coal-bearing strata of the Ravenscrag Formation covers most of the southern third of the province: roughly that area bounded between the International Boundary on the south; Manitoba on the east; Alberta on the west; and the southern Saskatchewan towns of Stoughton, Ceylon, Wood Mountain, and Shaunavon on the north. The lignite seams are usually poorly exposed because of weathering and a glacial soil mantle. However, most residents of Saskatchewan have at one time driven through the Estevan area and observed its three large strip mine operations. These can readily provide the visitor with a look at a fresh lignite coal seam while it is being mined.

The lignite itself may look uni teresting to the casual observer, b when a piece of it is carefully prepar for study under a microscope, becomes fascinating subject material. is the intent of this article to give a br introduction to the microscopic natu of some of our Saskatchewan lignit All the samples used for this purpo were collected from a working face the Utility Mine southwest of Estev The coal blocks collected are prepar on specially designed grinding a polishing machines to produce a waf thin slice of lignite firmly affixed b ween two glass plates. The norma opaque lignite is ground so thin t light readily passes through.

There are many different classi cation systems used by coal resea scientists when examining t microscopic components of coal su stances. I use what is called the Stop Heerlen system adapted for thin secti characteristics. This system has th major groups of microscopic co ponents (termed macerals): vitrin exinite and inertite.

All of the woody remains found coal are called vitrinite, and may c stitute as much as 80 per cent of

---

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Regina, Saskatchewan.

These remnants may occur with all ells preserved, or they may grade structureless vitrinite where the become progressively destroyed collapse under continued burial ure. Two components make up this p: the material comprising the cell (telinite) and the material filling ell cavity (collinite).

e second group, exinite, is made up ollen, spores, cuticles, resins, and . A cuticle is the protective skin on s and needles of plants. It is highly ant to decomposition and usually s a significant percentage of Saskat- an lignites. The spores and pollen almost always compressed and rted. Resinous and waxy bodies nite) are another important com- nt of exinite. They are usually d as isolated globular bodies but may be clustered.

e third major group in the Stopes- len system, inertite, includes an ue, finely divided detritus (massive inite), about which very little is vn. Perhaps the most important onent of inertite may have formed result of forest fires. Known as ite, it would be essentially a fossil coal. However, the effects of us micro-organisms can also trans- wood materials into fusinite sub- es. Generally speaking, fusinite of t fire origin has normal cell walls eas that of biological origin has len cell walls. The remains of al colonies give rise to another inert rial, scleretinite; it is very common nite coals of this age.

very common component of Saskat- an lignites is groundmass vitrinite. substance is a complex mixture of al of the above components. Essen- it is finely divided vitrinite par- s intimately mixed with pollen, spores, resinous particles, and often fusinite.

The photographic plates illustrating this article show that lignite is actually a complex mixture of wood fragments and tissues, spores, pollen, and other components. Careful examination of the relative amounts of these different components enables coal research scientists to understand the environmental conditions millions of years ago.

For example, a coal scientist can compare the relative abundance of structured vitrinite and fusinite with finely divided vitrinite and exinite. Using this basic framework we can infer that a dominating forest environment, rather than swampy conditions, existed if the coal is essentially woody tissue and fossil charcoal. On the other hand, a high proportion of groundmass vitrinite, spores, pollen, and other particles easily transported by water, would seem to indicate a reedy moor or swampy environment. An open water deposit would be indicated if the lignite section has a very high proportion of silts and clays, as well as the easily transported spores and pollen, but is very low in fossil charcoal (fusinite). These principles are generally valid, though there is considerable variability when examined in detail. By studying how the relative abundances of these components change through different levels of a lignite seam, the coal scientist is better able to understand the environmental factors in the gradual development of a peat bog into coal and to utilize this knowledge for the benefit of man. Knowing such qualities can direct more selective mining of the coal so as to mine the best coal at the least expense. Coal with high percentages of pollen, spores and resin has the highest heating value, and is thus the best to mine. The coal research scientist plays an important role in determining such characteristics and thereby determining the best mining practices.

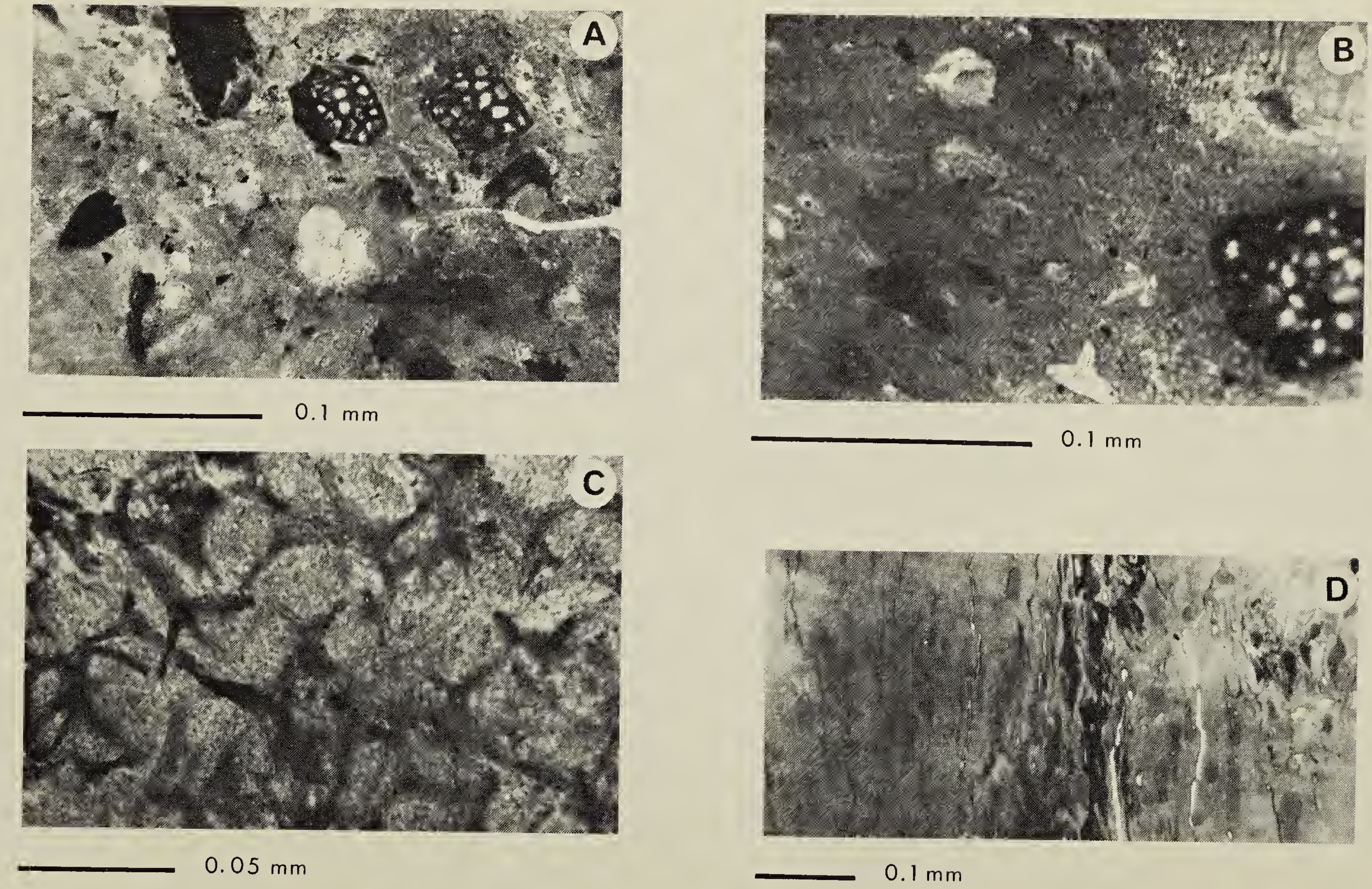


PLATE 1

A. Groundmass vitrinite with two large-celled fragments of fusinite, as well as disseminated inertinite, vitrinite, and resinite.

B. Groundmass vitrinite with scleretinite (upper left), pollen, and spores.

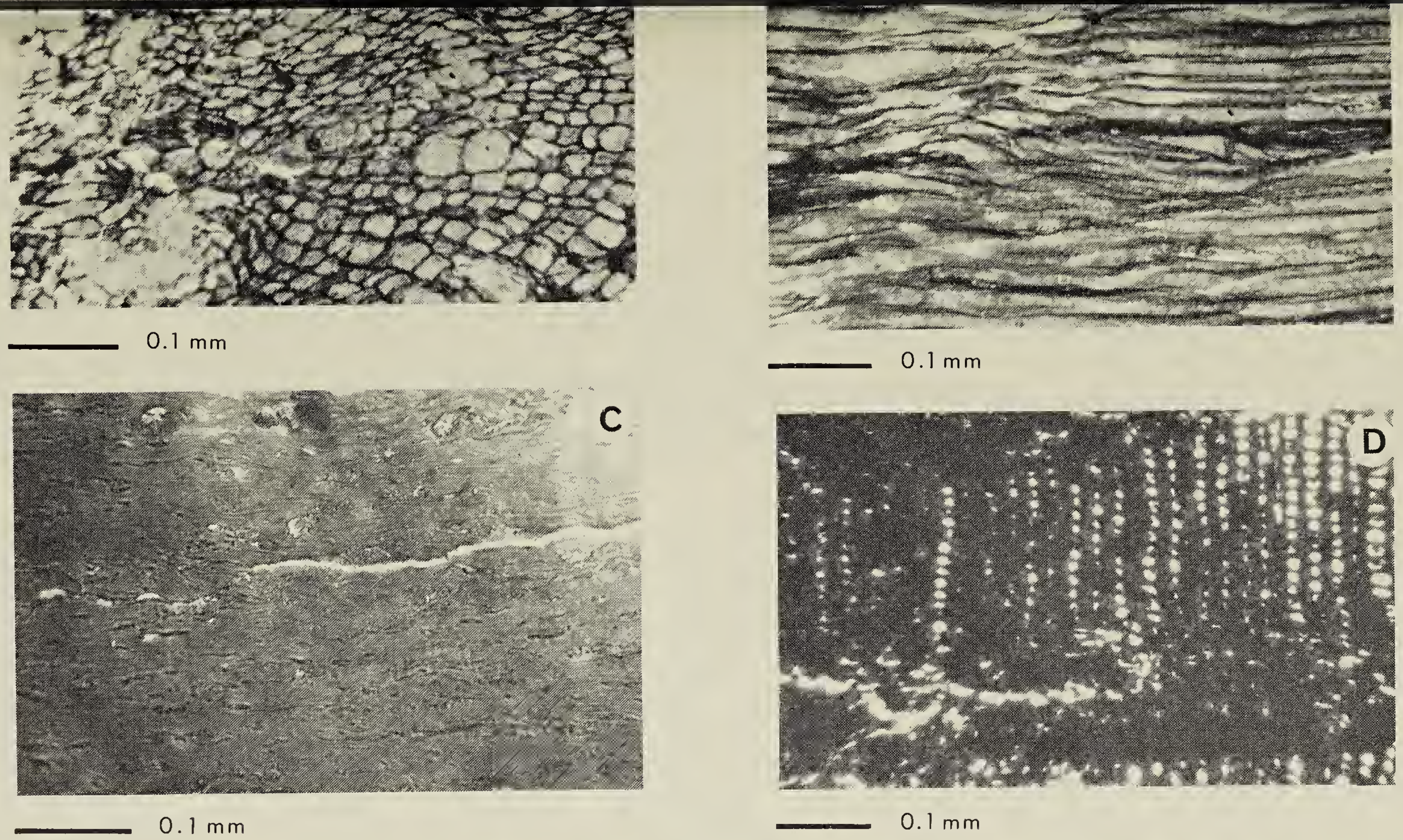


PLATE 2

A. *Cross section of a limb structure. The cell cavities of vitrinite have been partly replaced by gypsum.*

B. *Longitudinal section of a limb structure, vitrinite.*

C. *Vitrinite with an advanced stage of cell collapse.*

D. *Fusinite. The cell cavity voids have been partially replaced by gypsum, calcite, and kaolinite.*

30 Years Ago

An unusual contribution to ornithology in Saskatchewan was published unpretentiously in the April-May-June, 1943, issue of the *Blue Jay*. Laurence B. Potter of Eastend, Saskatchewan, submitted an article entitled "Saskatchewan Bird Records Made Since The Publication Of Mitchell's Catalogue Of Saskatchewan Birds In 1924". There were 27 species in the list, including 12 records that were still sufficiently noteworthy as to be referred to, either specifically or generally, in W. E. Godfrey's "Birds of Canada" in 1966. Taken verbatim from the article, the 12 are:

AMERICAN (COMMON) EGRET. — Specimen taken at Davidson by Reuben Lloyd, August 7, 1937.
MOUNTAIN PLOVER. — Sight record, J. Dewey Soper near Bracken, June, 1939.
BARN OWL. — Specimen obtained from Aylesbury, May 5, 1924.
RUFOUS HUMMINGBIRD. — Specimen picked up at Eastend in dying condition, Aug. 10, 1929 by Henry Clarke. Sent by L. B. Potter to Provincial Museum.
CALLIOPE HUMMINGBIRD. — Specimen taken by Charles Guiguet at Shaunavon, August 22, 1935.
PINYON JAY. — Sight record by L. B. Potter at Eastend, September 16, 1910.
BULLOCKS ORIOLE. — Sight record by Potter at Eastend, May 27, 1937. Specimen of young bird taken by Potter, July 10, 1937.
HEPBURN'S (GRAY-CROWNED) ROSY FINCH. — Specimen taken by Spencer Pearse, Ravenscrag, March 1, 1933.
GREEN-TAILED TOWHEE. — Specimen taken by Norman Clarke at Tregarva, June 6, 1929.
BLACK-THROATED BLUE WARBLER. — Specimen taken by John Nelson at Percival, October 21, 1936.
SAGE THRASHER. — Specimen taken south of Shaunavon on Frenchman River by Charles F. Holmes, June 24, 1933.
MOCKINGBIRD. — First seen by Potter at Eastend, May 31, 1928. Specimen collected June 4. Second specimen collected by S. A. Mann, Skull Creek, Nov. 1, 1929.

Four of the other records were:

HUDSONIAN CURLEW. — Specimen taken by Mitchell at Last Mountain Lake, May 29, 1924.
BLACK VULTURE. — Sight record, E M. Knowles, Regina, September 19, 1
SCREECH OWL. — Specimen taken by chell, Souris Valley, 1926.
CHIMNEY SWIFT. — Two specim secured by F. G. Bard from the Pas Hills, May, 1939.

The other 11 species were: Caspian T Blue Goose, Little Brown Crane, Yel Rail, Knot, Cooper's Hawk, Crested Fly cher, Lazuli Bunting, Rough-win Swallow, Connecticut Warbler and Gol crowned Kinglet.

JUNCOS WINTERING NEAR THE CHURCHILL IN SASKATCHEWAN

According to "Birds of Canada" Godfrey, the Slate-colored Junco been recorded wintering as far nort the Nipawin area. It might be of inte to note that there has been one Sl colored Junco here on the banks of Churchill this winter. I observed it Feb. 13, 14, and 15, 1973, for minutes on each of those dates, alw between 9:30 and 10:30 a.m. It was c wooden platform which was lean against the side of a plywood shed our yard, about 14 feet from the w dows. As these mornings were col was obviously taking advantage of morning sun's rays which shone aga the shed, and were reflected by plywood.

Seven years ago in Pine House L (about 15 miles south of the Church in December, 1966, I had seen a flock perhaps a half a dozen of these jun near our house a few times, but bei relatively new bird watcher I di realize they were out of their suppo winter range. — *Mrs. Theresa Za* Stanley Mission, Saskatchewan

WINTERING RAVENS AT SYLVAN LAKE, ALBER

On December 20, 1972, I sight Raven, which is not a common sigh in this part of Alberta. Then, on Year's Day, I saw a pair of these b flying across the road. Again on Jan 14, 1973, while I was having break a Raven flew past my house. I went side to investigate and saw two m birds flying above the tree tops. A ater, while snowmobiling near a grove along the lake shore, I d five Ravens flying near the ie. Upon investigation, I found he birds had been feasting on a pine carcass and had roosted in ruce overnight. Toward the end of ry it was not at all unusual to sight s in the area . . .

are having a very mild winter this nd, as a result of the wet fall, grain on the swath under the snow. The population has increased on swathed fields so the Ravens may ying because there is no lack of or them. — *Helge S. Abrahamson,* 68, Sylvan Lake, Alberta.

ISTRACTION DISPLAY BY A FEMALE NG-NECKED PHEASANT

the afternoon of June 6, 1971, on one of my frequent nature I was walking home through the tree grove on our ranch, when a Ring-necked Pheasant ran past topped walking and she stopped a et away, she then made a running around me back to her starting She stopped and uttered a loud . She then circled around again 2 feet of me, stopping at the same and uttering another loud chuck. I valked slowly to the place where ways stopped and several fluffy pheasants, not more than a day or ld ran in all directions. The r Pheasant came close to me ing one wing and limping slowly trying to lure me away too. I quickly away in the opposite ion of the baby pheasants leaving r pheasant to gather her brood er again.

is the first time that I have seen a Ring-necked pretend to be crip- in order to lure someone away her young. Usually the mother ant flies off leaving the baby nts to flatten themselves to the d, where they are almost invisible, a person looks for them very lly.—*Daisy D. Meyers,* Leader, chewan.

RED FOXES IN ALBERTA AND SASKATCHEWAN

Your story about the red fox making a comeback in Alberta prompted me to write a few lines, as the same thing seems to be happening in this area.

In the 1930's, there was nowhere near the wildlife there is in the area today. Beaver were gone completely and the fox as well. The Canada lynx and mink were very rare and deer and moose were scarce.

Last winter there were many beaver, fox, lynx and mink taken in this district. Deer are much more plentiful and occasionally a moose is heard.

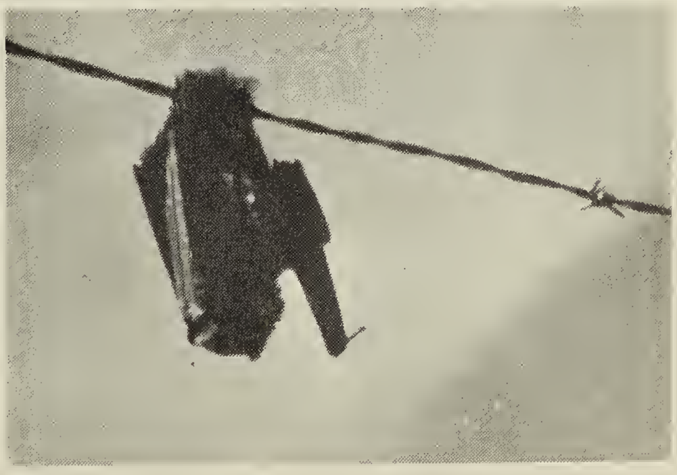
I don't pretend to know the reason for these changes. However, I think the government's policy of conservation has certainly helped and there are fewer farms in this area and less than 1/3 the people living here now.

Another rare animal for this district is the raccoon which I saw on Sept. 15, 1968, about 3 miles south and 1 mile west of Mullingar. — *Ralph Cowell,* Mullingar, Saskatchewan

BARBED WIRE AND A BAT

In September, 1972, when I was on a bicycle ride with a friend, we saw a bat hanging on a barbed wire fence. When we looked closer we found it was caught by its tail on one of the barbs. The photograph was taken with an instamatic camera.

Before removing the bat, I went home to fetch a pair of leather gloves in case we got bitten and caught rabies. The bat was so badly injured that it died. — *Ian Dayes,* (Age 9), Box 193, Unity, Saskatchewan



HOLIDAY PLACES AND ACTIVITIES FROM THE SASKATOON PUBLIC LIBRARY

Compiled by DIANE WEIR

In the list below there is reference to the "AV Department" and to the "Reference Department". Here is a brief description of these two components of many libraries. The Audio-visual Department lends both records and films (8 mm and 16 mm). Among the records in the Saskatoon Public Library are several of nature sounds, including the two Peterson albums of bird songs (west and east). Several of the films are on natural history. There are also catalogues of films available from other sources.

As will be noted in the list below, our Reference Department has some books that are not found in the Circulation Department. While Reference books can be used only in the library, we have listed two books from that Department both for your information and because they may be in the circulation departments of other libraries. (The call number would probably be similar with the "R" deleted.)

Our Reference Department also has a large selection of atlases and maps. Included are flat maps of countries and cities around the world (these may be borrowed) as well as topographical, geological and land use maps (which may not be borrowed). There are also several cabinets which contain the Tourist File. It includes booklets, road maps and other material on countries, provinces, states and cities, and these may be borrowed.

For boys and girls up to Grade 7, there are additional books on holiday places and activities in the Children's Department of the library.

ANGIER, Bradford. *Wilderness cookery.* 1963. Details on preparing game are combined with information on wild fruit and vegetables to make this a useful book for hunter, fisherman, camper, outdoor vacationist, and backyard barbecuer. 641.6 A588

BAIRD, D. M. *Nature's heritage.* 1967.
tures, illustrations, maps, and text combi
a book which shows the beauty and dive
of nature throughout Canada's nati
parks. 917.1 B

BROWN, P. L. *What star is that?* 197
guide to galaxies, constellations, stars
planets with 58 illustrations, 7 deep
charts, and 15 colour slides housed in the
department. Y523.8 B

CHERRINGTON, E. H. *Exploring the m*
through binoculars. 1969. A do-it-you
space programme with photographs ar
gazetteer of lunar features which enable
reader to obtain a detailed look at the m
with the only requirements being a s
telescope or a pair of binoculars and acce
the sky. Y523.3 C

FABRI, Ralph. *Painting outdoors.* 1969
troduction to outdoor painting and
characteristics of oil, watercolour, ca
polymer, pastel and felt painting. 758.1 F

FISHER, James. *Zoos of the world.* 1
British scientist, writing from firsthan
perience, relates an interesting view o
purpose, organization, and work of
throughout the world. 590.744 F

FREDRICKSON, O. A. *The silence o*
North. 1972. Narrative of the northern
vival of a 28 year old widow and
children in an uncleared homestead in
Canadian wilderness. 917.12 F

GRAVES, R. H. *Bushcraft.* 1972. Gr
instructions on survival in a wilde
situation where only natural materials
available. 613.69 G

Illustrated natural history of Canada. A
illustrated, seven volume set on nature i
various physical areas of Canada.

ALLEN, R. T. *Great Lakes.* 1970. (an
copy in the Reference Department)
574.9713 A

BODSWORTH, Fred. *Pacific Coast.* 1
(another copy in Reference) 574.9711 B

BRAITHWAITE, Max. *The western p*
1970. (other copies in Reference, L
History Room, and Stack) 574.9712 B

EDWARDS, R. Y. *The mountain ba*
1970. (another copy in Reference)
574.971141 E

LEFOLII, Kenneth. *St. Lawrence V*
1970. (another copy in Reference)
574.9714 L

LIVINGSTON, J. A. *Canada.* (another
in Reference) 574.971

MOON, Barbara. *The Canadian Sh*
1970. (another copy in Reference)
574.9712 M

E, Russ. *The complete book of nature raphy.* 1971. Valuable tool for those ved with such subject matter for graphy as plants, flowers, birds, rep- mphibians, and underwater and marine 778.943 K55

OCK, George. *Wild refuge.* The story National Wildlife Refuges throughout nited States and the men who try to ve such animals as the American bison e whooping crane. Y333.78 L427

LEJOHN, B. M. *Why wilderness.* 1971. port on mismanagement in Lake ior Provincial Park. 333.78 L777

ALL, R. P. *Fossils for amateurs.* 1972. de to collecting and preparing inver- e fossils. 560.75 M143

IONAL GEOGRAPHIC SOCIETY. *ica's historylands. Touring our land- of history.* 1962. For those interested iting historical sites in the United States eir vacation, here is a book with 676 ations and maps, most of them in r. (In Reference only) R917.3 N277a

IONAL GEOGRAPHIC SOCIETY. *ca's wonderlands. The scenic national and monuments of the United States.* A book of maps and vacation hints 90 full-colour illustrations of scenery, ies, wildlife and plants. (In Reference R917.3 N277

ONS, Christopher. *Making wildlife s.* 1971. Excellent guide for amateur emi-professional movie enthusiasts includes chapters on scripting, ishing scenarios, editing, adding sound, anipulating both the subjects and the a. 778.5369

ON, B. L. *The Canadian Rockies trail* . 1971. A hiker's manual to the nging and rugged Rocky Mountain . 796.522 P322

SOM, J. E. *Fossils in America.* 1964 nature, origin, identification, and ication, and a range guide to collecting 560.973 R212

RFF, Robert. *Canada's mountain al Parks.* 1966. Natural history and and tourist information are found in ook on the mountain parks of Banff, r, Glacier, Kootenay, Mount stoke, Waterton Lakes and Yoho. 917.1025 S311

H, K. V. *The Canadian bicycle book.* Combination of history and practical advice on the sport of bicycling which shows its unique values as recreation and a fitness activity. 796.6 S653

SPEARS, Borden. *Wilderness Canada.* 1970. Beautiful colour photographs capture the mood and majesty of Canada's wild and combine with essays by experts to make this a valuable book on Canada. FA917.1 S741w

THOREAU, H. D. *In wilderness is the preservation of the world.* 1967. Each selection by Thoreau is faced by an interpretive colour photography by Eliot Porter, 72 full pages in all to make a beautiful, impressive volume. 779.3 T488

ZAIDENBERG, Arthur. *Drawing all animals.* 1967. By clear advice and examples, one is shown how to draw large and small animals, both wild and domesticated. It includes a number of representative species in sketches. 743.6 Z21a

There are a large number of books available on camping, fishing, and canoeing The following is a selection of some titles in these areas.

ANDERSON, L. A. *A guide to canoe camping.* 1969. 797.122 A547

ANGIER, Bradford. *Introduction to canoeing.* 1973. On Order

BARAB, Marvin. *Family camping handbook.* 1969. 796.54 B223

BENNETT, Tiny. *The art of angling.* 1970. 799.12 B472

CANADIAN FAMILY CAMPING FEDERATION. *Family camping in Canada.* 1970. 796.54 C212

ELLIOTT, C. N. *The outdoor observer:* how to see, hear and interpret in the natural world. 1969. 799.1 E46

ENGEL, L. K. *The complete book of motor camping.* 1971. 796.54 E57

MORRIS, Dan. *The weekend camper.* 1973. On Order

ORMOND, Clyde. *Outdoorsman's handbook.* 1970. 796.5 O73o

STRUNG, Norman. *Camping in comfort;* a guide to modern outdoor vacations. 1971. 796.54 S927

SULLIVAN, G. E. *The backpacker's handbook.* 1972. 796.54 S949

LOOKING BACK

In this issue we have presented some articles that may give readers new ideas summer weekends and holidays. For instance, places to go: the Killdeer Badlar provincial parks, areas, particularly national parks, described in books and map local libraries are a few suggestions. And don't forget the summer outing at Hud Bay. As for things to do, have you considered photography, painting and sketchi feeding hummingbirds in your yard, counting nighthawks in your city or town building and setting out nest boxes in your area. There are additional ideas in library book list, such as, identifying stars, camping, canoeing, fossil collecting others. Finally, with less than 1,600 individual members, it is obvious that, where you go, you'll be meeting people who are not SNHS members. If they are interes in nature and conservation, you may be doing them a favour by letting them kr about the Society and the *Blue Jay.*

Questionnaire: Many thanks to the 211 people who took the time and troubl return completed questionnaires. We have them partly tabulated and will give yo summary of the results in the September issue. Already, however, we are wonder if the age of respondents is the same as the age of our readers. Less than 10% those replying were under 20 years of age. Does this mean that only 1 out of readers is under 20 or that public and high school students did not reply at the sa rate as older members? If we really have that few younger readers, we are proba failing to get an appreciation of nature across to those who will make the differe in the future.

S.N.H.S. SUMMER MEETING — 1973

June 15 and 16 at Hudson Bay, Saskatchewan

See the newsletter for details but here they are briefly:

Headquarters: Red Deer Hotel, Hudson Bay.
Registration: Friday evening.
Field Trips: To three areas, including the wilderness area of the Pasquia Hill — cougar country.
Guest Speaker: Hugo Maliepaard, Saskatchewan Department of Environment.
Organizers: Tom White and Stan Riome.

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P.O. Box 1321, REGINA, SASKATCHEWAN, S4P 3B8

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